

NIVMA

TRENDS®*



FIELD MANUAL
JUNE 6, 1997

Northern Interior Vegetation Management Association
*Treatment Regime Evaluation - Numerical Decision Support

1997 PREFACE

Modifications to the 1996 *TRENDS*© protocol were completed early in 1997 and are documented in this field manual. Major changes were made to the soil description, site disturbance, and coarse woody debris in that new variables are now being measured, some old ones were dropped, and the transects have changed for the later two. Other subjects, such as stand description, have had the errors in tables corrected and the instructions expanded. Site index, height correction, root disease information and multi-story heights and ages were reviewed as a package. The result is more instruction, clearer definitions, and two forms ending up as four. Minor changes and corrections have been made elsewhere in the field manual including changing the name of the “crop/non-crop trees” to “repeatedly measured trees with competition description”, and “repeatedly measured trees”, respectively.

Not all the changes and corrections to the protocol and field manual could be completed for this field season due to limited resources, both monetary and personnel. The front part of the manual was not worked on except to remove any contradictory statements. Instructions by subject, i.e., stand description or soil description, have been moved to the individual subject sections of the manual. No changes to forms will occur during the field season in 1997. Changes, corrections and improvements will have to be made next year.

Quality control must become the battle cry for the 1997 field season. Appended to this preface is a flow chart that provides the time table by which we must operate this season. The chart with target dates for each activity was one product from a Quality Control Workshop held April 24, 1997, and attended by NIVMA members, the *TRENDS*© protocol development team, and the database development team. 1996 field forms continue to trickle into the office even now (June) as we prepare for the 1997 season. Late arriving forms are difficult to deal with because those responsible for entering and checking data for NIVMA have other commitments, plus problems on forms can not be dealt with because no contractor is going to be able to remember what happened on any given installation they were on ten months ago. Please review the time table provided and insure that you are meeting your obligations for the flow of data from field to database.

Another change for this year are the Sign Off Sheets; pre- and post-harvest versions are in the manual just before the tab sections. Also, a copy of each can be found in the binder pocket along with copies of the forms for reproducing on water-proof paper. A completed sign off sheet must accompany each set of forms for an installation. The sign off sheet will provide contractors and members with a list of forms necessary for each installation; if a form is not applicable for some reason, please indicate on the sheet why a form did not have to be filled out. The sheet will provide NIVMA with a measure of quality control in that individuals will be taking responsibility for insuring that data is collected and recorded according to the protocol.

Training is offered again this year and certification will be discussed, and recommendations made, by the people present at the training course. I am sure that other quality control issues will also be discussed during the three day training session. From the contact I have had with the field crews doing *TRENDS*©, contractors want to do an excellent job of what is a very complex piece of field work. The training, time table, instructions in the manual, field audits of crews, and office audits of forms will all help us in providing quality data for the *TRENDS*© database and future decision-making.

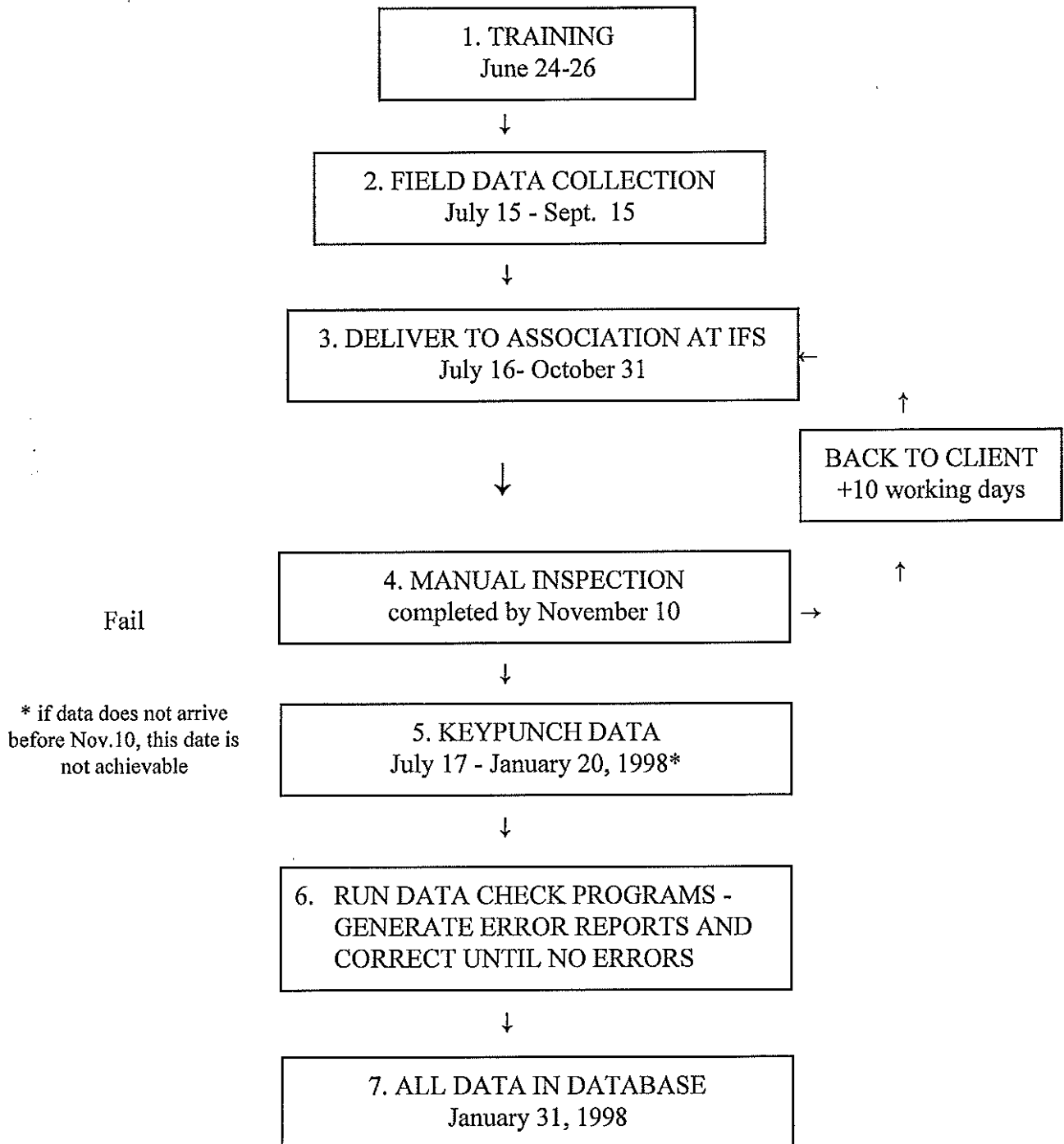
Andrea Eastham

June 16, 1997

ACKNOWLEDGEMENTS

Protocol revisions for 1997 were completed by Naomi Donat, Andrea Eastham, and Pete Tollestrup of Industrial Forestry Service Ltd., Prince George, B.C. We would like to thank Chuck Bulmer (MoF Research Branch), Paul Sanborn (MoF Prince George Region), and Bill Watt (soils consultant, Williams Lake, B.C.) for their invaluable assistance in revising the soils portion of the protocol. Thanks also to Richard Reich (MoF Prince George Region) for technical advice regarding the root rot information, and Craig Delong (MoF Prince George Region) for sharing his expertise on assessing coarse woody debris. Lastly, we would like to thank Penni Adams for the wonderful graphics, Alvina Derksen for production of the final version of the text and forms, and Tom Szauer for providing us with his experience, knowledge, and ever vigilant eye for detail.

1997 TRENDS SILVICULTURE MONITORING SYSTEM



Pre-Harvest NIVMA *TRENDS* Installation

Sign Off Sheet

Obligation Number: _____

Component	Print Name when checked	Signature
Administration Information		
Reference trees (Admin. Form)		
Exposure (Admin. Form)		
Location info. (Admin. Form)		
Stand description (including plot radius used)		
Site index		
Height correction		
Root disease info. (In tomentosus or armillaria suspected areas)		
Multi-story heights and ages		
Quadrant description		
Vegetation inventory (remember to collect samples and take photographs of any unknowns)		
Soil descriptions (remember to take a photograph, map the pit location)		
Eco-classification		
Subplot density sweeps		
Coarse woody debris		
Installation diagram (map the reference trees)		

Crew Leader's Signature

Date

Member's Signature

Date

*I certify that the data for this installation was accurately collected and recorded in accordance with the 1997 NIVMA *TRENDS* Silviculture Monitoring Protocol.*

*I certify that the Administration information for this installation is accurate and that all data has been recorded in accordance with the 1997 NIVMA *TRENDS* Silviculture Protocol.*

Post-Harvest NIVMA *TRENDS* Installation

Sign Off Sheet

Obligation Number: _____

Component	Print Name when checked	Signature
Updated Administration Information		
Update location information (if you have moved the P.O.C)		
Stand description (only if residual trees are left)		
Root Disease Information (In tomentosus or armillaria suspected areas)		
Multi-story heights and ages (only in partially harvested, multi-storied stands)		
Vegetation inventory (remember to collect samples and take photographs of any unknowns)		
Soil description (only if not properly completed pre-harvest)		
Eco-classification (if not completed pre-harvest)		
Subplot density sweeps, plantable spot survey (if not planted yet), "regen" survey (if planted), dropped cone survey (on naturally regenerated pine areas).		
Site disturbance		
Cone crop (on naturally regenerating sites only)		
Repeatedly Measured Trees		
Competition description		
Coarse Woody Debris		
Installation diagram (map the RMT's)		

Crew Leader's Signature

Date

Member's Signature

Date

*I certify that the data for this installation was accurately collected and recorded in accordance with the 1997 NIVMA *TRENDS* Silviculture Monitoring Protocol.*

*I certify that the Administration information for this installation is accurate and that all data has been recorded in accordance with the 1997 NIVMA *TRENDS* Silviculture Protocol.*

The eight monitoring objectives addressed by the *TRENDS*© protocol are:

1. Monitor years to breast height for timber supply planning purposes.
2. Monitor years to free growing for silviculture policy purposes.
3. Monitor tree performance in relation to the height of competing vegetation as a basis for reviewing the free growing targets.
4. Monitor years to breast height at various levels of site disturbance as a basis for reviewing soil conservation guidelines.
5. Monitor years to green-up height.
6. Monitor tree performance from various silviculture regimes to assist in identifying trends in outcomes.
7. Describe changes in plant species communities following disturbance.
8. Monitor forest health in managed stands.

The Tree vs. Shrub Dilemma

"Vegetation" inventories are recorded on several forms throughout the *TRENDS* Protocol. Big trees (those ≥ 7.5 cm dbh) are recorded on the Stand Description form. Small trees (germinants, seedlings, and saplings) are recorded on the Subplot Densities form. Shrubs, herbs and mosses are recorded on the Vegetation Description form. Then, to confuse matters even more, on post-harvest installations any vegetation, be it big trees, small trees, shrubs, herbs or mosses, is recorded in terms of its proximity and percent cover in relation to the Repeatedly Measured Trees (RMT's).

The above explanation can be simplified into two basic procedures (they just happen to be recorded on several forms). These two procedures are the *inventory* phase (simply a record of what is on the installation) and the *competition* phase (what is influencing the growth of the RMT's). The Stand Description, Subplot Densities, and Vegetation forms make up the *inventory* phase and the Competition Description forms make up the *competition* phase.

Confusion arises when dealing with "shrubby trees" or "tree-like shrubs" such as alders, birch, aspen, and sometimes maple. Which forms are these recorded on? To answer this question, it helps to separate the protocol into the *inventory* and *competition* phases.

Inventory Phase:

Start with the Stand Description form. Any stem, no matter what its *form* (i.e. tree-like or shrub-like) must be recorded on this form when its dbh is 7.5 cm or greater.

Then a decision must be made for the rest of the installation. If you have some "shrubby trees" or "tree-like shrubs" make a decision that will stand for the whole installation. Decide which species will be classed as trees (i.e. A4, A5, and A6's and will be recorded **only** on the Subplot form) and which will be classed as shrubs (i.e. B1 and B2's and will be recorded **only** on the Vegetation Description form). **Remember that no species can be listed on both the Subplot Densities form and the Vegetation Description form** as this will result in the species being double counted.

Competition Phase:

All species are "fair game" for the Competition Description form where the top 5 competing species are listed. When deciding what to record in the "Vegetation within the 45° Cone" portion of the form, use the same decision for trees and shrubs as you did for the Subplot Densities vs. Vegetation Description. For example, if you considered small alders to be B2's and recorded them on the Vegetation Description form, then consider them B2's for the Competition Description form.

Site Index / Multi-story Heights and Ages /Height Correction Decision Key Worksheet

1. Assess Percent Cover by Layer

Layer	Percent Cover	Percent of Total	≥ 10% of Total
A0 + A1			
A2			
A3			
A4			
A5			
Total			

4. Are there 4 or more layers with at least 10% of the total crown cover?

Yes

Complete the Multi-Story Heights and Ages form. Then proceed to the Height Correction Form.

Yes

Complete the form for as many Top Height trees as necessary. Then proceed to the Height Correction form.

No

Complete the Site Index form.

Are Top Height Trees available?

No

Do not complete the SI form. Skip to the Height Correction form.

Height Correction

Insure that between the Site Index form/Multi-Story Heights and Ages form and the Height Correction forms that you have measured the heights of at least 6 trees: two tall, two medium, and two short.

TABLE OF CONTENTS

1	INTRODUCTION	1
2	MONITORING OBJECTIVES	2
2.1	Quantify the years to breast height for Timber Supply Planning purposes	2
2.2	Describe the years to free growing for silviculture policy purposes	2
2.3	Provide a basis for reviewing the definition of Free Growing	3
2.4	Quantify the impacts of various levels of site disturbance on years to breast height as a basis for reviewing Soil Conservation Guidelines	3
2.5	Provide a basis for reviewing the expected years to green-up	3
2.6	Provide a basis for reviewing the efficacy of silviculture practices	4
2.7	Identify common successional patterns in given ecosystems following disturbance regime	4
2.8	Quantify the potential impacts of abiotic factors (damage) and pest incidence on years to breast height and stand development	4
3	GENERAL PROTOCOL DESCRIPTION	4
3.1	Plot Design	5
3.2	Protocol Overview	5
3.3	Site Selection	5
4	IMPLEMENTATION PROCEDURES	5
4.1	Office Procedures	9
4.1.1	Random Selection of Cutblocks	9
4.1.2	Randomly Locating Installation Within Selected Cutblocks	9
4.2	Field Procedures	10
4.2.1	Field Location	10
4.2.2	Pre-Harvest Installation Establishment	11
4.2.3	Post-harvest Establishment and Re-establishment	13
4.2.4	Rules for Selecting Repeatedly Measured Trees (was called Crop Tree/Non-crop Trees)	13
5	NON-RANDOM PAIRED PLOTS FOR TREATMENT COMPARISONS	14
6	HANDLING OF COMPLETED FIELD FORMS	16
7	ANALYSES AND REPORTING	16
8	TIMING	16
9	AUDITING	17
10	MAINTENANCE OF PLOTS	18

11	PERSONNEL QUALIFICATIONS	18
12	LIST OF MATERIALS	19
13	RESPONSIBILITIES	19
14	ACKNOWLEDGEMENTS	20

LIST OF TABLES

Table 1.	Criteria for Selecting Paired Installations	15
Table 2.	Standard Schedule for Measuring <i>TRENDS</i> ® Installations in Years	17

LIST OF FIGURES

Figure 1.	Layout of an installation using the <i>TRENDS</i> ® silvicultural protocol illustrating quadrants, 3.99 m radius subplots, gridpoints and numbering convention	6
Figure 2.	Monitoring protocol components and the levels at which they are measured	7
Figure 3.	Sequence of activities to establish and measure monitoring installations	8
Figure 4.	Installation flagging procedure	12

Northern Interior Vegetation Management Association

TRENDS© Silviculture Monitoring Protocol

1 INTRODUCTION

The Northern Interior Vegetation Management Association (NIVMA) is a forest industry cooperative which, since 1989, has been building a database for assessing plantation performance by having members use a common silvicultural monitoring protocol. The original protocol was called the Unified System of Silvicultural Monitoring (USSM) and was developed "to allow for the collection of a common database for the use of the Association members to assess the efficacy of vegetation management procedures" by measuring crop tree survival and growth in relation to other vegetation (USSM Manual 1990). NIVMA members have established 850 installations as of the end of the 1995 field season using the USSM protocol and the database is now generating valuable information for silviculture decision-making.

Although the USSM database is a valuable and unique dataset, members' concerns for solely evaluating vegetation management treatments has expanded to include an evaluation of performance in achieving targets such as breast height, free growing and green-up. There is also a need to monitor attributes such as biodiversity and longer term site productivity in terms of reduced liability and projected future revenues relative to the policies set by the Ministry of Forests.

Through input from members, reviewers' comments, workshop outputs, and analyses of the existing database, a second protocol has been developed to meet the expanded monitoring objectives of the association. This new protocol is called **Treatment Regime Evaluation - Numerical Decision Support** (*TRENDS*©). A prototype *TRENDS*© protocol was field tested and technically reviewed to guarantee that the field data collected could be analyzed to generate reports that meet the monitoring objectives (Banerjee et al. 1996)¹.

The prototype *TRENDS*© was subsequently revised for use in the field. The following provides the rationale behind the monitoring objectives with a description of the *TRENDS*© protocol including the sampling strategy, plot layout, office procedures, installation and measurement procedures, scheduling, and data handling. Building of the database system and data checking programs, as well as a standardized routine for timely reporting of results to members, are planned and will occur between now and October, 1996.

¹ M. Banerjee, I. Moss, and A. Brackley. 1996. Structural Review of NIVMA Objectives. Unpublished report for NIVMA.

2 MONITORING OBJECTIVES

The eight NIVMA monitoring objectives are explained in detail below to provide the reader with a complete understanding of what information needs to be collected in order to meet these objectives in an analytical context and provide silvicultural decision-making support.

2.1 Quantify the years to breast height for Timber Supply Planning purposes

It is current practice to incorporate regeneration delay as a factor in establishing plantations. Gains in productivity have resulted from reducing the acceptable regeneration delay period. Further gains may be made by reducing the number of years for crop trees to reach breast height.

The number of years it takes a stand to reach breast height is a figure used in Timber Supply projections that affects the period to green-up, the total years to minimum operable harvest and physical rotation age. Insofar as it is under- or over-estimated across broad landscapes, there may be significant impacts on timber supply projections.

Timber Supply projections are made with reference to timber type and site index. Site index is developed from top height and the years to breast height, derived from stem analyses or retrospective regeneration performance assessments. Therefore, each installation must be designated as a timber type with an assigned site index. In addition, land management objectives, particularly with reference to land use categories or zones, are critical for determining the outcome.

2.2 Describe the years to free growing for silviculture policy purposes

This objective is stated with respect to a broad regional perspective that seeks to identify the overall success of NIVMA members in achieving the policy objectives set by the Ministry of Forests. The data collected to achieve this objective are intended as a report relative to current basic silviculture performance guidelines. Variances with respect to installations achieving free to grow height requirements before the earliest free growing date, or after the latest date, according to the Silviculture Prescription, will be reported. The sampling strategy and intensity of the monitoring protocol will provide information as to why variances may have occurred more intensively than might otherwise be available through operational databases. Therefore, silviculturists will be able to make better interpretations of where failures and successes are occurring and focus on problems that should be addressed.

2.3 Provide a basis for reviewing the definition of Free Growing

The free growing definition imposes a view of seedlings and their surrounding vegetation such that preferred and acceptable seedlings be: i) a minimum height, ii) above a minimum seedling-to-vegetation height ratio for the vegetation within a 1 m radius of the seedling, and iii) within a minimum and maximum number of years post-harvest. As well, this definition imposes a requirement for vegetation management treatments when none may in fact be needed to produce a healthy vigorous stand. The treatments themselves have been questioned in terms of exposing seedlings to increased damage due to such factors as frost and terminal weevil. It is not known whether the potential benefits of creating the free growing conditions outweigh the associated risks.

The real concern is whether or not a seedling has reached a particular height within a maximum allowable time frame. Having met such a requirement, there may be concern as to the future height growth relative to proximal, over-topping, non-crop tree vegetation. In that the trees declared free growing should have a strong likelihood of reaching a merchantable size in a reasonable amount of time, the definition depends more critically on what happens beyond the point of free growing, rather than before that point. Therefore longer term monitoring of seedlings that are initially both acceptable and unacceptable according to the current free growing definition is required.

2.4 Quantify the impacts of various levels of site disturbance on years to breast height as a basis for reviewing Soil Conservation Guidelines

This objective might be better restated by replacing "years to breast height" with "site index", or more generically, with productivity. The concern over current legislative guidelines is that they are either overly restrictive, or not sufficiently restrictive. In the first instance, costs are incurred and opportunities are lost in a needless effort to protect certain values. In the second instance, the guidelines result in losses in productivity for generations to come.

2.5 Provide a basis for reviewing the expected years to green-up

Expected years to green-up provides data that is needed to initiate Timber Supply Models in that it constrains the ability to harvest adjacent areas. The specific concerns are largely identical to those for Objective 2.3, but at a later stage of plantation development. This objective is met by projecting when trees reach some reference height (commonly 3 m) and minimal stocking standards derived from either the silvicultural prescription or regional standards. As with free growing, there is a need to both quantify the number of years required to green-up, and determine whether specific treatments hasten or defer achievement of this standard. Meeting this objective allows for the definition of the relationship between time to achieve a green-up standard and longer term stand productivity issues.

2.6 Provide a basis for reviewing the efficacy of silviculture practices

The premise of this objective is that the efficacy of any given silvicultural operation translates to consistent results and predictable outcomes. Given a specific sequence of treatments, what is the probability of reaching a given standard (e.g. free growing, green-up) in a specified period? Extended over a greater time period, what are the effects of specific sequences of treatments on:

- (i) minimizing liability during the plantation establishment phase
- (ii) capturing site productivity in crop trees vs competing vegetation
- (iii) timber supply planning

Ideally, we would wish to calculate for any given sequence of treatments the risk factor and the unit of gain associated with that specific treatment on both a site type basis and cost per hectare basis. Ultimately, a small range of treatments will be identified as most efficient and cost effective for a given range of site types.

2.7 Identify common successional patterns in given ecosystems following disturbance regime

This objective recognizes that vegetation on a site has a large range of non-timber values such as habitat or biodiversity, particularly at the landscape level. Currently these values are not well defined, but are increasingly constraining silviculture activities. Therefore, monitoring information is required on the effects of specific silvicultural treatments on the successional patterns that affect habitat and biodiversity. Information on successional patterns is also required to develop more complete stand dynamic models. In the long term we wish to know both what kinds of habitats are being created and what are being lost by silvicultural treatments. These data provide a baseline for developing landscape level biodiversity guidelines regarding silvicultural practices.

2.8 Quantify the potential impacts of abiotic factors (damage) and pest incidence on years to breast height and stand development

The goal of this objective is to identify over-riding factors that can come to dominate a site, and thus become the largest limitation to achieving silvicultural goals of plantation establishment. Essentially, what is needed is the identification of the level of risk that a given installation will become dominated by a single abiotic (windthrow) or biotic (leader weevil) factor, or a complex of factors leading to persistent declines relative to silvicultural targets. There is a need to not only define mortality directly due to damaging agents, but also decline factors in the surviving crop.

3 GENERAL PROTOCOL DESCRIPTION

The following is a general description of the *TRENDS*© layout and an overview of the steps required in the field for establishing plots and implementing the monitoring protocol.

3.1 Plot Design

A *TRENDS*® installation is a 30 m x 30 m square plot for a total of 0.09 hectares (Figure 1). The installation is orientated north-south and divided into four quadrants always numbered starting with the NE quadrant as illustrated in Figure 1. A 3.99 m radius circular subplot is located at the centre of each quadrant and is referred to by the same numbering convention as for the quadrants. A 36 point grid is established over the installation with 5 m between grid points and 2.5 m between the outside boundary of the installation and the outer row of grid points. Grid points are numbered from 1 to 36 starting with number one at the NE corner of the installation and adhering to the convention provided in Figure 1. Each grid point is the centre of a 2.5 m radius circular grid plot. All distances must be slope corrected at establishment, i.e., measured on the horizontal.

3.2 Protocol Overview

The various parameters measured and recorded on an installation occur at different levels on a plot as illustrated in Figure 2. The shaded area on each plot defines the level at which specific information is collected. Figure 3 provides the sequence of activities for the field work and indicates the person-days required to complete these steps.

3.3 Site Selection

The population being monitored is the hectares of land required to be reforested in northern B.C. and Alberta within the responsibility of the association membership. We want to know how we are doing in terms of the effects of silviculture treatments on performance. We therefore randomly select sites for installations from this population to obtain a representative sample.

Sometime in the future, sampling may be restricted by site group and/or treatment to capture plots representing specific site types not represented through the random selection process. The *TRENDS*® protocol can also be used in operational trials to compare specific treatment regimes. See Section 5 for details on non-random paired plots for treatment comparisons.

4 IMPLEMENTATION PROCEDURES

The following section describes how to properly select and establish installations. It is necessary to take to the field the complete manual, including all forms and tables. It is expected that in the near future, the NIVMA Field Reference Guide (June 1995) will be updated to match the finalized *TRENDS*® protocol allowing personnel to go to the field with forms and field guide. Ultimately, programmed data loggers will replace the paper forms.

Quadrant 4

Quadrant 1

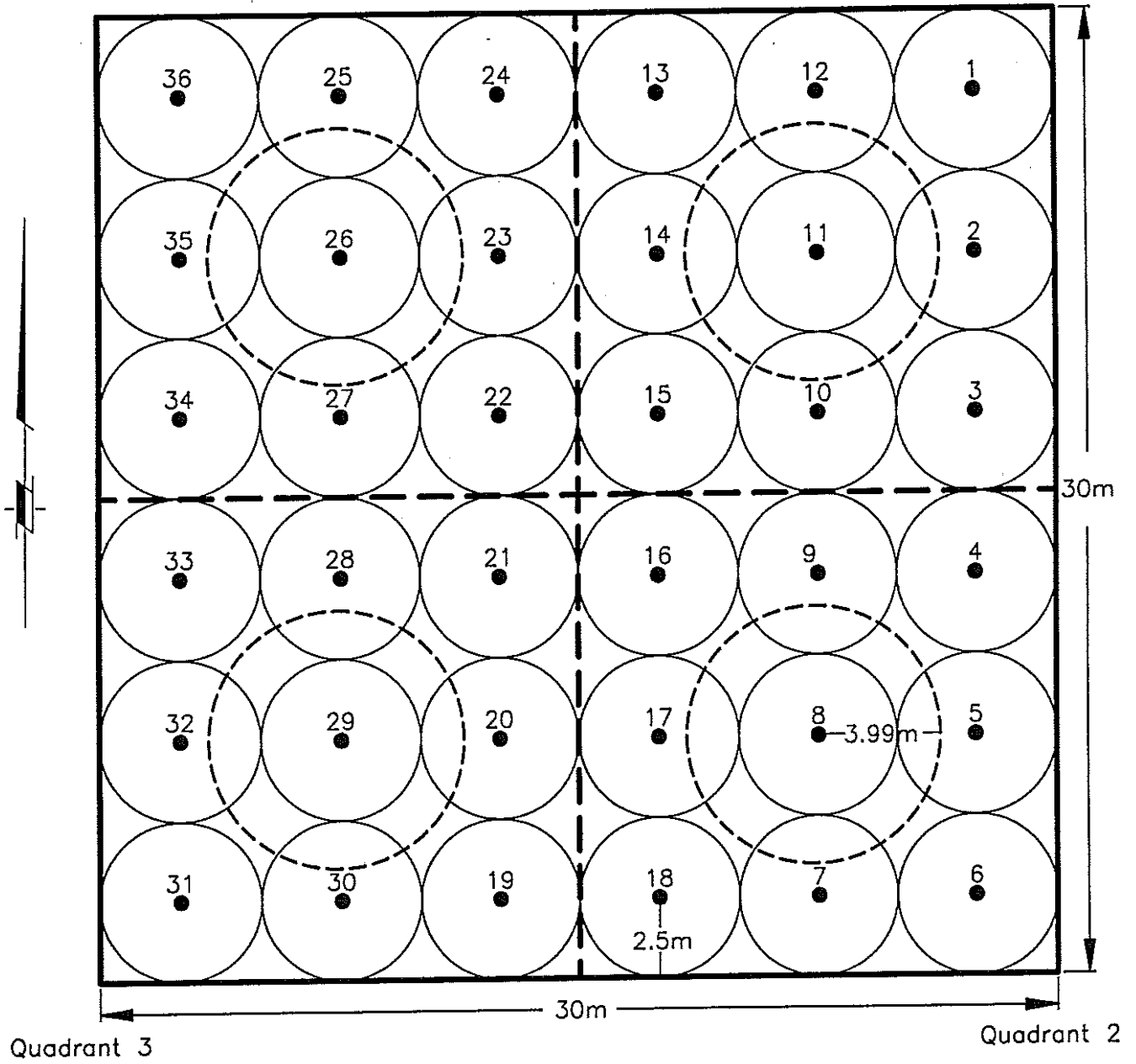
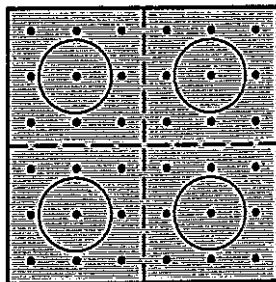
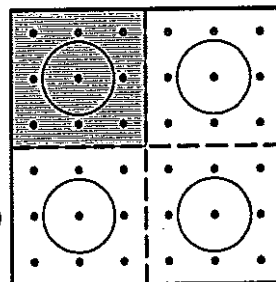


Figure 1. Layout of an installation using the *TRENDS* silvicultural protocol illustrating quadrants, 3.99m radius subplots, gridpoints and numbering convention.

- Installation Level:
- stand description:
 - overstory cruise
 - site index
 - additional height trees
 - root rot incidence
 - (-general ecotyping)
 - soil pit
 - cone crop rating

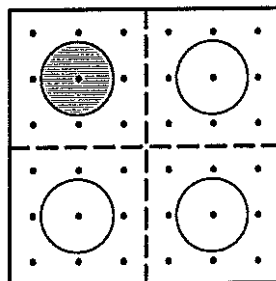


- Quadrant Level:
- photographs
 - slope
 - surface substrates
 - microtopography
 - vegetation (shrubs; herbs and mosses)

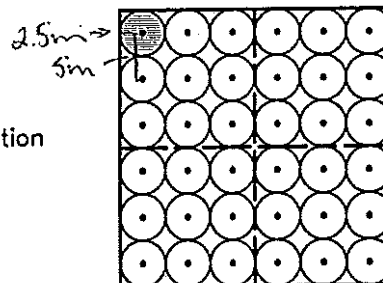


- Subplot Level:
- small tree density
 - regeneration/plantable spot surveys

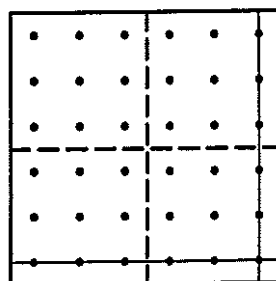
3.99m radius.



- Grid Plot Level:
- eco-classification
 - crop and non-crop tree selection



- Transect Lines:
- site disturbance = post harvest
 - coarse woody debris = pre harvest



- Quadrant Corners:
- densiometer readings
 - often for areas of partial harvest.

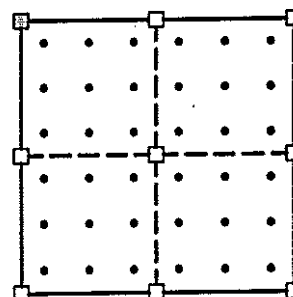


Figure 2. Monitoring protocol components and the levels at which they are measured.

NIVMA TRENDS Silviculture Monitoring Protocol

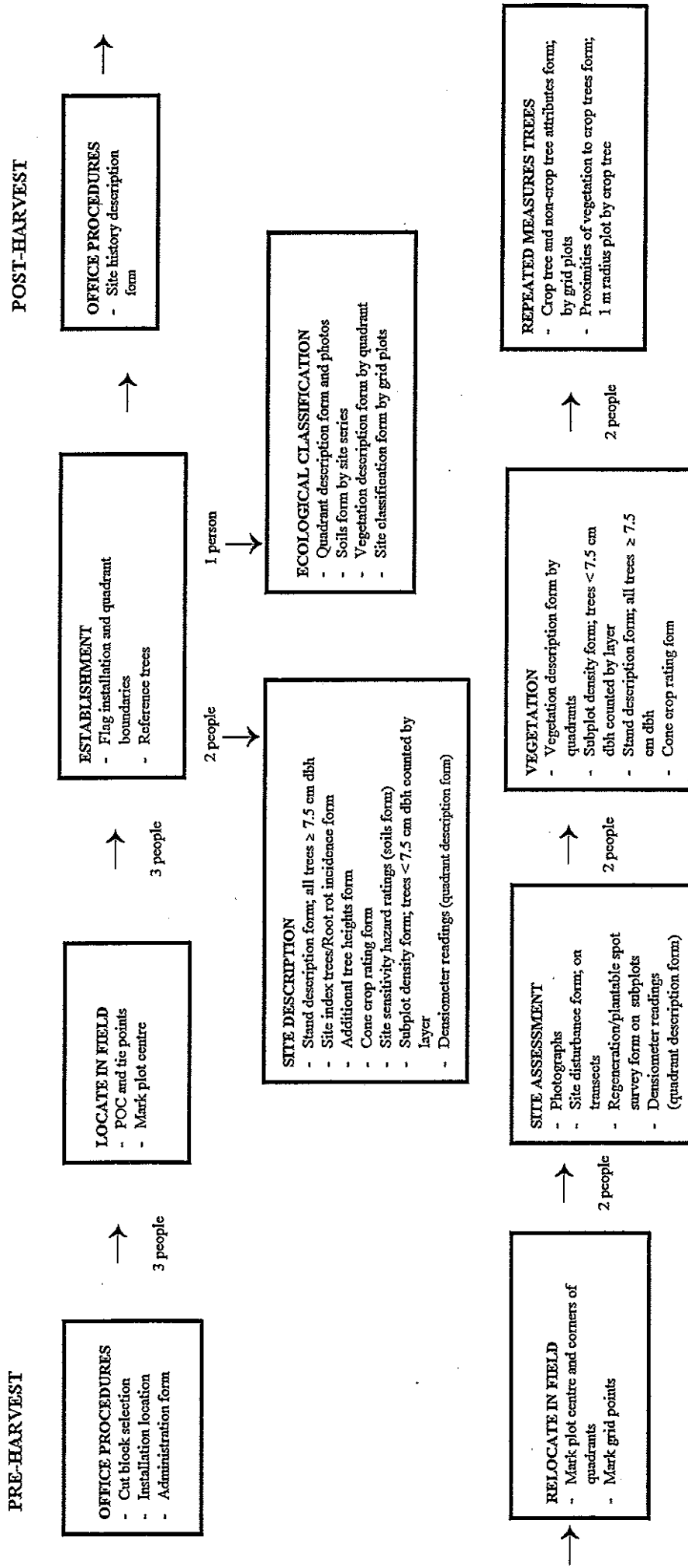


Figure 3. Sequence of activities to establish and measure monitoring installations.

Strict adherence to the protocol procedures in terms of layout, field numbering, and completion of the forms, is the corner stone to the creation of a quality database. It is important to contact a member of the *TRENDS*© protocol development team if problems are encountered during implementation.

Please contact: Naomi Donat/Pete Tollestrup/Andrea Eastham
@ (604) 564-4115 (phone)/(604) 563-9679 (fax)

The protocol steward must be contacted if codes are used which do not appear in the allowable codes provided with this manual.

The protocol steward is: Andrea Eastham
Industrial Forestry Service
(604) 564-4115 (phone)
(604) 563-9679 (fax)

4.1 Office Procedures

4.1.1 Random Selection of Cutblocks

Sampling within *TRENDS*© is a two step process of first randomly selecting the cutblocks from the population scheduled for harvest in the coming year, and second, randomly locating the monitoring installation from all hectares to be reforested within the sample cutblocks.

Use the following procedure to calculate if a cutblock should be sampled:

- Random Landscape Representation sampling intensity, as set by the association each year, determines number of installations to be established pre-harvest.
- Determine all the cutblocks to be harvested in the year following the current field season; i.e., either in the fall/winter after September 15th, or the next summer.
- List the blocks and sequentially sum up the total hectares, block by block, so that every hectare in each cutblock is represented by a unique number. This ensures that each hectare has an equal chance of being selected. The chance of a block being selected is proportional to its size, so large blocks have a greater chance of being selected than smaller blocks.
- Generate random numbers within the range of the total hectares to be harvested. Select the cutblock that includes the hectare that corresponds to the random number. A couple of extra cutblocks should be selected in case cutblocks are removed from harvest. Random numbers can be generated by several computer programs or by using a random number table.

4.1.2 Randomly Locating Installation Within Selected Cutblocks

Installations are usually located pre-harvest, ideally after pre-development when right-of-ways and roads will provide access and tie points.

- Overlay a 1 point per 900 m² (30 m x 30 m) transparent grid on the cutblock. Photocopy the grid and cutblock map and then number each grid point sequentially from 1 to n. Squares that fall outside of areas to be reforested such as on proposed roads and landings, or within no-cut reserves, are not used in the selection process and so are not numbered. If landings, etc. are to be reforested, then they are a valid part of the population and should be included in the selection process.
- Generate a random number between 1 and n using the random number table. The corresponding point that matches the random number represents the location of the NIVMA installation centre within the cutblock. Select one or two alternate squares in case the location out in the field does not meet the criteria for installation location, i.e., not to be reforested. If more than one *TRENDS*® installation is to be placed in a cutblock, randomly select two different squares.
- One can randomly select a couple of alternate installation locations for a block, which may be used only if the original location is found to be not valid in the field (i.e., >50% of the installation area falls within an area which is not within the Net Area to be Reforested), to allow immediate replacement in the field. To avoid bias, it is crucial that the alternate installation locations not be used for convenience, and if used, recruited in the same order that their associated numbers were drawn. If replacement occurs, the circumstances for the substitution should be documented and provided to the Protocol Steward.
- Record the distance and azimuth to the location of the installation centre from a photo tiepoint to be confirmed in the field.
- Produce a map for field location. The field map must have a scale, North arrow, point of commencement (POC), and azimuth and distance to the installation centre. It must also have a latitude/longitude or UTM reference point.
- Complete the Administration form. The history is recorded on this same form for the life of the installation. It is extremely important to have these data current and accurate as they become the factors by which all performance data will be sorted.

4.2 Field Procedures

Measurements must be taken after crop trees have set bud and vegetation is at or near maximum cover and height. Generally this will occur between July 15 and September 15. If trees have not set bud when the site is visited, measurement must be delayed until bud development is complete. Refer to previous forms for time of measurement when buds were set and full leafout occurred to optimize scheduling.

4.2.1 Field Location

Accurate field location and mapping of the installation is essential if installations are to be easily found by those auditing the installation and crews performing future year's measurements. There are no guarantees that the same contractor, or even the same crew, will be revisiting the installation. Always locate and map the installation and identify the P.O.C (Point of Commencement) so that the installation can be located easily by someone who has never been there before.

- Locate the photo tiepoint selected in the office, or if necessary select one in the field. Examples of good tiepoints include corners or forks in established roads or corners of swamps. Be sure that you can accurately pinpoint your location on an aerial photograph and cutblock map. If close enough to the cutblock, this tiepoint may also serve as your P.O.C. Otherwise, choose a more suitable P.O.C closer to the installation, being sure to carefully record the azimuth and distance from the tiepoint to the P.O.C.
- Mark the P.O.C using paint, ribbon, and a metal tag on a tree or other object that will not be affected by harvesting. See below for tag labelling format:

<p style="text-align: center;">NIVMA - P.O.C</p> <p style="text-align: center;">Obligation no.</p> <p style="text-align: center;">Distance and Azimuth to Installation Centre</p>

- Accurately locate the installation centre in the field.

4.2.2 Pre-Harvest Installation Establishment

- Locate the installation centre by submerging a railway spike or six inch piece of rebar into the ground. It should not be in a position to hinder any machinery that may be on the block at a later date. If you are in an area where the rebar cannot be submerged, e.g. rock, submerge the rebar nearby and accurately record the azimuth and distance to the installation centre. **Do not move the installation centre.**
- Refer to Figure 4 for the method to flag installation boundaries. All measures must be corrected for slope, i.e., measured on the horizontal. Two or three people should work together to ensure that the installation is laid out as a square:
 - two people walk from plot centre, one to the NE corner and one to the SW corner, hanging blue flagging at 10.6 m to identify the centre of the subplot for the quadrants along the way. Check that the installation centre is in a straight line from the NE to the SW corner.
 - hang a double pink flag at 21.21 m to signify the NE and SW corners of the installation.
 - return to the centre and repeat the above procedure for the NW and SE corners.
 - check the distances from one corner to another, along the boundaries of the installation, hanging a blue flag at 15 m to signify the quadrant boundary. Each side of the installation should be 30 m (± 20 cm). Corner locations must be relocated and checked until they are within this limit of error.
 - hang pink flagging along the installation boundary.
 - hang blue flagging along the quadrant boundaries.

NOTE: It is essential that all flagging be removed when leaving the pre-harvest installation so that no confusion is created for the road building and harvesting contractors.

Figure 4

Figure 4. Installation flagging procedure 12

- Select three or four reference trees within the bounds of the installation in a triangular shape around the installation centre. These reference trees should each be approximately 5 m from the installation centre so that one machine pass will not obliterate them all.
- Paint the bases of the reference trees at ground level between roots facing the installation centre.
- Staple a metal tag at the base of each tree.
- Mark the tag with the obligation number, and the azimuth and distance to the installation centre.
- Record reference tree information on the **Administration form** and map the location of the reference trees on the **Installation Diagram form**.

4.2.3 Post-harvest Establishment and Re-establishment

- Re-establish installation post-harvest following the same method as for pre-harvest.
- Install wooden posts at the installation centre, corners, and subplot centres once no machinery will be on site.
- Establish the grid points according to Figure 1, permanently marking them with painted or tagged wire assessment pins, or wooden stakes, numbered 1 to 36 using the numbering convention in Figure 1. The criteria for pins or stakes for marking grid points are that the material be durable, easy to find, and that they be numbered.

4.2.4 Rules for Selecting Repeatedly Measured Trees (was called Crop Tree/Non-crop Trees)

- The repeatedly measured tree (RMT) designation, with (+CD) or without the competition description, is a decision that should be made by the NIVMA member.
- All RMTs have the same data collected and are recorded on the same form, Attributes of Repeatedly Measured Trees. The difference between designating a tree as a RMT + CD vs a RMT is that the vegetation in a 1 m radius plot around each tree must be recorded for the RMT+CD. Therefore, the time to complete measurements on a RMT+CD is longer than for a RMT, and this should be considered when deciding how much of what to measure within each grid plot.
- Species-type refers to the species and regeneration method, i.e., planted, advanced, or natural.
- At least one species-type must be designated as a RMT+CD to capture the data of "individual tree with competing vegetation in its close proximity" that is critical to meeting the monitoring objectives.
- One of each species-type must be selected on each grid plot for a total of 36 on an installation. This means that if you pick pine as your RMT, then in the field you can not select a planted pine seedling at grid point 1, a natural regeneration pine at grid point 2, a planted pine at grid point 3, etc. Instead, you must select a planted pine at each of the 36 grid points and a natural regeneration pine at each of the 36 grid points if both these pine-types have been designated as RMTs.

EXAMPLE: Spruce is the preferred species but pine and subalpine fir are also acceptable according to the stocking standards in the silviculture prescription, and aspen is present on site. Some options for selecting trees in this situation are:

1. Designate planted spruce as RMT+CD, and natural regenerated pine and advanced regeneration subalpine fir as RMT only (no vegetation assessment) for a total of 36 RMT+CDs and 72 RMTs for an installation.
2. Designate planted spruce and planted pine as RMT+CD, and advanced regeneration subalpine fir as RMT for a total of 72 RMT+CDs and 36 RMTs for an installation.
3. Designate all three species, one of each regeneration type, as RMT+CDs for a total of 108 for an installation.
4. Designate planted spruce and planted pine as RMT+CD, natural regeneration pine as RMTs, and advanced regeneration subalpine fir and natural regeneration subalpine fir as RMT for a total of 72 RMT+CDs and 108 RMTs for an installation.
5. Option 1., plus designate aspen as RMTs, for a total of 36 RMT+CDs and 108 RMTs for an installation.
6. Designate planted spruce as RMT+CD for a total of 36 for an installation. This is the minimum that should be measured on any installation.

5 NON-RANDOM PAIRED PLOTS FOR TREATMENT COMPARISONS

The *TRENDS*® monitoring protocol can be used to allow the direct comparison of results between a treated site and untreated site. Please refer to Simard (1993)² for a more complete description of all the issues that must be addressed and applied to successfully compare treatments in the field. The following only provides information that may be useful in deciding whether treatment comparisons are a desirable option. It is strongly recommended that members talk to their favourite researcher prior to implementing silvicultural field trials.

Paired installations must be located on homogenous sites with similar site series and history. Similarity criteria guidelines taken from Simard (1993) are outlined in Table 1 to ensure that installations are sufficiently comparable for analysis.

² S.W. Simard. 1993. PROBE: protocol for operational brushing evaluations. Land Mgt. Rpt #86. B.C. Min. of Forests

Table 1. Criteria for Selecting Paired Installations

Characteristic	Similarity criteria
Mesoslope position	same class (crest, upper slope, middle slope, lower slope, toe, depression)
Slope	$\pm 10\%$ (if slope is 30% in one then the other plot can range from 20% to 40%)
Aspect	± 45
Elevation	± 50 m
Soil texture and coarse fragment content	same broad class: fragmental, sandy-skeletal, loamy-skeletal, clayey-skeletal, sandy, clayey, loamy (see particle size classes for soil family groupings Canadian Soil Classification Guidelines ³)
Soil moisture regime	same class (xeric, subxeric etc)
Site series	same dominant site series or same per crop or sample tree
Vegetation complexes	same dominant species
Timber type	same dominant tree species
History	same (years and type of treatments except for the treatment being monitored)

- For comparing treated and not treated installations, it is necessary to locate a site that can accommodate two plots. If installations are used to evaluate rate trials (e.g. herbicide rates, grazing intensities) then more installations will be required. It may require finding two similar sites in order to have enough space for multiple treatment trials.
- A treatment plot larger than the monitoring plot must be established and a minimum distance of 50 m between installations on a site is required. These two requirements are necessary to insure that the entire area being monitored is treated, and that the treating of one plot does not affect the other.
- Installations can be established at any point in time in the life of a stand. If established other than at pre-harvest (e.g. to monitor at juvenile spacing), an installation should be established prior to treatment and remeasured as required following the standard measurement schedule found in Table 2.

³ The Canadian System of Soil Classification. 1978. Canada Dept. Agriculture. Ottawa, Canada.

6 HANDLING OF COMPLETED FIELD FORMS

- The centralized database is located at Industrial Forestry Service and data entry is done on site.
- Please send completed forms as they become available to avoid a data entry bottle-neck that could occur if all members wait until all measurements are finished for the year.
- After checking forms, members send completed sets to:
NIVMA
c/o Industrial Forestry Service
1595 Fifth Avenue
Prince George, B.C.
V2L 3L9
- Data is checked for completeness and accuracy at the time of entry. If problems arise, the protocol steward contacts the contractor responsible.
- After entry, the set of completed forms is returned to the owner for filing.

7 ANALYSES AND REPORTING

There is currently a proposal on the table to complete the work required to have an association database in Oracle. The proposal includes creating the database for the *TRENDS*© protocol, merging the USSM database with the new database, developing installation and regional summaries, and producing the analytical tools required to produce tree annuity tables. The tree annuity table approach provides the silvicultural decision making summaries. The proposal has been approved in principal by the NIVMA Advisory Council and the decision of when to proceed will be decided this season.

8 TIMING

- Installation measurements must be taken after bud set and at full leaf out to be accurate, usually in the period July 15 to September 15.
- Scheduling of attributes to be re-measured is dependent on the kinds and frequency of activity. Specifically, the activities referred to here are harvest, site preparation, planting, and stand tending.
- Complete history records and data collection dates are key to creating a time variable in the database.
- All members must adhere to the standard schedule in Table 2 to facilitate direct comparison with other installations in the database. Failure to do so in the past has resulted in a reduction in the amount of complete and usable data in the current database.
- More frequent measurements can be accommodated within the database.

Table 2. Standard Schedule for Measuring *TRENDS*® Installations

Monitoring Installation Elements	Activities								
	Harvest	Site Preparation	Planting/ Natural Regeneration	Brushing & Weeding		Juvenile/ Sanitation Spacing	Fertilizing	Commercial Thinning	Pruning
Chemical									
Manual/ Animal									
Admin. & History	At establishment, amended with each additional activity.								
Stand Description	At establishment and, when standing trees are left, immediately post-harvest and every five years after harvest.								
Site Index/ Multi-Story	At establishment.								
Height Correction	Whenever heights are collected on the Stand Description Form.								
Root Rot	At establishment and immediately post-harvest.								
Quadrant	At establishment								
Vegetation	-1, 1, 2, 3, 5, 7, 10, 15	1, 2, 3, 5, 7, 10, 15	1, 2, 3, 5, 7, 10, 15	-1, 1, 2, 3, 5, 7, 10, 15	-1, 1, 2, 3, 5, 7, 10, 15		1, 2, 3		
Soil	At establishment and 10 years after harvest.								
Eco-class	At establishment								
Subplot Density	-1, 1, 2, 3, 5, 7, 10, 15	1, 2, 3, 5, 7, 10, 15	1, 2, 3, 5, 7, 10, 15	-1, 1, 2, 3, 5, 7, 10, 15	-1, 1, 2, 3, 5, 7, 10, 15	-1, 1, 2, 3	1, 2, 3		
Regeneration and/or FG Surveys in B.C.	The regeneration survey must be completed prior to Regen Delay. The Free Growing survey must be completed either in conjunction with, or at least in the same season as, the operational FG survey that is conducted on the rest of the block. As long as surveys are completed at the four subplot centres in the <i>TRENDS</i> installation, then the data can simply be transferred from survey cards to the <i>TRENDS</i> forms.								
Site Disturbance	1, 5, 10, 15	1, 5, 10, 15 if mech or burn						1, 5, 10, 15	
Cone Crop Ratings	-1, 1, 2, 3	1, 2, 3							
RMT+CD and RMTs	for natural: 1, 2, 3, 5, 7, 10, 15		1, 2, 3, 5, 7, 10, 15	-1, 1, 2, 3, 5, 7, 10, 15	-1, 1, 2, 3, 5, 7, 10, 15	1, 2, 3, 5, 7, 10, 15	1, 2, 3, 5, 7, 10, 15		1, 2, 3, 5, 7, 10, 15
Competition Description	for natural: 1, 2, 3, 5, 7, 10, 15		1, 2, 3, 5, 7, 10, 15	-1, 1, 2, 3, 5, 7, 10, 15	-1, 1, 2, 3, 5, 7, 10, 15	1, 2, 3, 5, 7, 10, 15	1, 2, 3, 5, 7, 10, 15		1, 2, 3, 5, 7, 10, 15
CWD	-1, 1, 5, 10, 15	1, 5, 10, 15 if mech or burn				-1, 1, 5, 10, 15		-1, 1, 5, 10, 15	
Installation Diagram	At establishment for Reference Trees and Root Rot. Any time RMTs are selected.								

"-1" = Measurements must be collected in the measurement window (July 15 to September 15) prior to the treatment. In the case of harvesting, "-1" refers to "at establishment" and may be several seasons prior to harvest.

"1" = Measurements must be collected in the measurement window (July 15 to September 15) immediately following treatment. In the case of summer planted stock, it is the first visit after the trees are planted (this may be the same season as planting, or one year later).

2 - 15 refer to measurement seasons post-treatment.

9. AUDITING

Two types of audits are used to assess contractor performance in implementation of the *TRENDS*® Silviculture Monitoring Protocol; they are the Mentoring Audit and the Random Audit. The Mentoring Audit occurs after training, when the crew leader has established their first installation. The purpose of this audit is to check on the crew leaders to ensure that they have correctly implemented all components of the protocol, to clear up any misunderstandings and make suggestions where improvements should be made. Random field audits provide NIVMA with a method to check that trained, certified contractors are maintaining high standards and consistency in measurements when implementing the *TRENDS* protocol.

A member of the *TRENDS*® development team, along with a forester from the member company that owns the installation being audited, conduct the audit. Contractors being audited are asked to attend the field audit. For more information on the audit process, please see the Forum section of the NIVMA web site (www.nivma.bc.ca).

10. MAINTENANCE OF PLOTS

Maintenance of the installations occurs during each re-assessment. For installations with little activity, and therefore infrequent re-measuring, replacement of the P.O.C. tag, wooden posts, grid point pins, and any numbered tree tags, must be done as a separate activity at least every three years. Maintenance of tree numbers on the installation is critical to the integrity and subsequent use of the database.

11. PERSONNEL QUALIFICATIONS

Personnel with field experience in collecting data for growth and yield plots, permanent sample plots, timber cruising, inventory, site index determination, site disturbance surveys, soil classification, ecological classification, regeneration surveys, or vegetation identification in forestry are preferred.

Crews working on *TRENDS*® installations must have at least one crew member who has successfully completed the NIVMA *TRENDS*® training course. Participants in the training course should have three years of forestry experience with a working knowledge in the areas listed above. Training participants are graded on their performance, ability and experience, to provide a rating that is provided to NIVMA members on a Contractors Eligibility List. Please see the Forum section of the NIVMA web site (www.nivma.bc.ca) for more information on training.

12 LIST OF MATERIALS

Pre-harvest Establishment:	
Equipment	Supplies
NIVMA Manual, Tables and Field Reference Guide tally board (8.5" X 11") 1:10,000 scale hand compass hipchain diameter tape Suunto dbh tape increment borer and straws for cores tape measure plot cord marked at 1.26, 3.99 and 5.64 m staple gun camera shovel field reference guides: Eco-classification, Pest identification, Plants 2, 30 m tapes hatchet binoculars (for cone crop ratings)	pink ribbon, blue ribbon and orange ribbon aluminum tags for POC and reference tree labels staples weather resistant paint film NIVMA tally forms iron pin (u-shaped rebar or railway spike for marking installation centre) straws for increment cores
Post-harvest Re-establishment/Remeasurement	
As above	As above plus: 5 cedar stakes 2" X 2" tags for numbering crop and non-crop trees at least 36, 1" X 2" wooden stakes to mark grid points

13 RESPONSIBILITIES

The successful establishment and remeasurement of installations to create a usable database requires commitment from a team of people. Specifically, responsibilities are:

- Member:
- random selection of sample blocks and installation location
 - complete history records
 - selection of qualified contractors and administration of contracts

- RMT+CD and RMT designation
- checking field forms for completeness prior to submission to NIVMA
- maintaining required measurement schedule
- maintaining complete files on installations including forms and photos
- maintaining installations
- 1:10,000 maps with north arrow and UTM or latitude/longitude lines through at least one point on the map for later determination of the UTMs for the center of the installation.

Field personnel:

- strict adherence to the protocol
- forms completed neatly and accurately
- inform protocol steward of codes used not in the data dictionaries
- sending installation package to member for checking prior to submission to NIVMA (this package includes the forms, maps showing location of block and installation on the block, and a copy of the SP)

Protocol steward:

- log problems and new codes
- correct field problems
- give new codes to database steward
- correction of errors on forms at data entry
- updates to protocol manual
- location of installations should be filed with the appropriate ministry district office; a procedure is not in place for this year, but should be considered by the NIVMA members.

14 ACKNOWLEDGEMENTS

The *TRENDS* protocol was developed over a two year period through the hard work of many individuals, too numerous to mention. Thanks to the individuals who provided concepts and ideas; to those who collected the necessary details to create forms and tables; to the folks who reviewed the protocol; to the team that produced this manual, and to the members of NIVMA who continue to enthusiastically support the monitoring program.

Pre-Harvest NIVMA *TRENDS* Installation

Sign Off Sheet

Obligation Number: _____

Component	Print Name when checked	Signature
Administration Information		
Reference trees (Admin. Form)		
Exposure (Admin. Form)		
Location info. (Admin. Form)		
Stand description (including plot radius used)		
Site index		
Height correction		
Root disease info. (In tomentosus or armillaria suspected areas)		
Multi-story heights and ages		
Quadrant description		
Vegetation inventory (remember to collect samples and take photographs of any unknowns)		
Soil descriptions (remember to take a photograph, map the pit location)		
Eco-classification		
Subplot density sweeps		
Coarse woody debris		
Installation diagram (map the reference trees)		

Crew Leader's Signature

Date

Member's Signature

Date

*I certify that the data for this installation was accurately collected and recorded in accordance with the 1997 NIVMA *TRENDS* Silviculture Monitoring Protocol.*

*I certify that the Administration information for this installation is accurate and that all data has been recorded in accordance with the 1997 NIVMA *TRENDS* Silviculture Protocol.*

Post-Harvest NIVMA *TRENDS* Installation

Sign Off Sheet

Obligation Number: _____

Component	Print Name when checked	Signature
Updated Administration Information		
Update location information (if you have moved the P.O.C)		
Stand description (only if residual trees are left)		
Root Disease Information (In tomentosus or armillaria suspected areas)		
Multi-story heights and ages (only in partially harvested, multi-storied stands)		
Vegetation inventory (remember to collect samples and take photographs of any unknowns)		
Soil description (only if not properly completed pre-harvest)		
Eco-classification (if not completed pre-harvest)		
Subplot density sweeps, plantable spot survey (if not planted yet), "regen" survey (if planted), dropped cone survey (on naturally regenerated pine areas).		
Site disturbance		
Cone crop (on naturally regenerating sites only)		
Repeatedly Measured Trees		
Competition description		
Coarse Woody Debris		
Installation diagram (map the RMT's)		

Crew Leader's Signature

Date

Member's Signature

Date

*I certify that the data for this installation was accurately collected and recorded in accordance with the 1997 NIVMA *TRENDS* Silviculture Monitoring Protocol.*

*I certify that the Administration information for this installation is accurate and that all data has been recorded in accordance with the 1997 NIVMA *TRENDS* Silviculture Protocol.*

TRENDS PROTOCOL UPDATES

July 3, 2000

New pre-harvest establishment rule and partly harvested blocks

NIVMA is interested in gathering information on the Net Area to be Reforested (NAR) only. To reduce the chance of cut boundaries or permanent roads running through the installation, we will no longer establish installations whose centres lie within 20 m of areas not within the NAR. These would include cut block boundaries, wildlife tree patches, riparian reserves, and permanent roads.

In cases where boundaries and roads are moved after pre-harvest installations are established, the original 50% rule will apply, i.e. as long as at least 50% of the installation is within the NAR, the installation can be maintained. It is not thought to be economically feasible to maintain an installation where less than 50% of the installation is within the NAR.

No measurements should be taken in areas that are not part of the NAR. As a general rule, do not collect data in a plot, be it Stand Description Plot, Vegetation Quadrant, Subplot, or Grid Plot, if any part of the particular plot in question includes area not to be reforested. For example:

- a. Stand Description: Record residual trees only if you can do so by using one of the standard plot sizes as specified in the Stand Description section of this manual (i.e. circular plots with radii of 11.28 or 13.8 m, or the whole 30 m by 30 m installation).
- b. Vegetation Description: record only on full quadrants that do not include any non-harvested area.
- c. Subplots: record only those subplots that do not include any non-harvested area.
- d. Site Disturbance: assess the whole installation. Record an "X" under 'disturbance type' in areas not within the NAR.
- e. Repeatedly Measured Trees: select RMTs only at grid plots that are completely within the NAR.
- f. Coarse Woody Debris: assess only the part of the transect that lies within the NAR. Record the length of the transect assessed and the reason for assessing less than 30 m.

Partially Cut Installations

These refer to installations that are being managed using a partial harvest silvicultural system, or where random residuals are left in a clearcut. The objectives of the Stand Description section are to track changes in stand level attributes over time. These include volume/ha, basal area, diameter distributions, crown closure, etc. We may also want to look at individual trees in terms of their changes in height, diameter, Live Crown Ratio, Radial Crown Width, vigour, or windfirmness.

A representative sample of these stand level attributes should be collected. Therefore, when collecting Stand Description information on post-harvest installations where standing trees are left, use a plot size that captures at least 60 trees 7.5 cm dbh or larger. Trees to be measured that were not numbered pre-harvest must be given a unique number not already used on the installation pre-harvest. For example, if pre-harvest trees were numbered 1-75, the new trees not already numbered could start at 100.

The Height Correction form must be completed whenever the Stand Description form is submitted.

Regarding RMTs in partially harvested installations, big trees are no longer eligible as RMTs. RMTs must be in layers A4, A5 or A6. See section 2.1 in this year's update to the Repeatedly Measured Trees section for further details.

**Administration
and
Site History**

Updates to TRENDS© Protocol, April 16, 1998
Administration and Site History Description

✓ Cell 8.	UTM Coordinates <u>Range delimited</u> UTMN between 5,000,000 and 7,000,000 UTME between 0 and 99,999		
✓ Cell 10.	Exposure <u>delete</u> other	O	
✓ Cell 12.	Sampling Strategy and Type <u>add</u> non-random member interest	N MI	
✓ Cell 23.	Broad Type of Disturbance <u>delete</u> other	O	
✓ Cell 24.	Type of Harvesting <u>delete</u> other <u>add</u> single or double-grip cut-to-length processor/forwarder feller buncher/cut-to-length processor/forwarder	O	CTL MCL
✓ Cell 28.	Site Preparation Method <u>change description</u> burning piles <u>add</u> ripper plow vehicle mounted spreader	PBURN RPCS VMSPR	
✓ Cell 29.	Site Preparation Type <u>add</u> Donaren mounder	DONARE	
✓ Add Cell 38a.	Season of Planting spring (cold stored) summer (not stored) fall (not stored) winter (either, coastal only)	Sp Su Fa Wi	
✓ Cell 41.	Stand Tending Method <u>move to 42. Stand Tending Type - Hand Tools</u> brush saw handsaw extension pole pruning shears	BRUSH HANDS POLE SHEAR	
✓ Cell 43.	Stocking Standards "B" <u>change on form</u> Early Assess. = 2 cells wide		

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

*In Alberta, Obligation No. = agency short form for Timbermark/1998 for C.P./001 or block no./and number installations 01 - n.

3. Obligation No.	Timbermark	C.P.	Block	Installation	1. Agency	1.a Prov.
4. Paired Plot	Timbermark	C.P.	Block	Installation	2. Licence	
5. Region/District	6. BCGS Mapsheet	7. Opening#	8. UTM Coord's.	Zone	NAD	9. Elevation (m asl)
		N				10. Exposure
		E				
11. Management Objective	1	2	3			
15. Inventory Label				12. Sampling Strategy	13. Intensity: 1/	
			Install. Type			
16. Date Installed	17. Initials of Recorders	18. Contractor				
y	m	d				
19. Installation Objectives:			20. Location (POC descrip. , Dist./Azimuth from POC & mappable point):			

14. REFERENCE TREE DATA			
Species	DSH (cm)	Dist. (m)	Azimuth

21. HARVESTING/DISTURBANCE HISTORY	Ref. No.	22. Harvest Commenced	Harvest Complete	23. Broad Type	24. Type of Harvest	25. Type Skld.	26. Silv. System
Notes:	1 y	m d	y m d				
	2 y	m d	y m d				
	3 y	m d	y m d				

21. SITE PREP. HISTORY	Ref. No.	22. Site prep comp date	27. Tech.	28. Method	29. Type	30. Kg ai/ha	31. L/ha ml/frill	32. Notch Space
Notes:	1 y	m d				.		
	2 y	m d				.		
	3 y	m d				.		

33. STOCKING STANDARDS "A" (SILVICULTURE PRESCRIPTION)											
Ref. No.	Min. Spac	Target sph	Min. sph	Preferred				Acceptable			
				spec. 1	spec. 2	spec. 3	spec. 4	spec. 5	spec. 6	spec. 7	spec. 8
1	.										
2	.										
3	.										

ARTIFICIAL REGENERATION HISTORY AND SOURCE											
Ref. No.	22. Treatment Completion Date	34. Tech.	35. Regeneration Method	36. Stock Type				37. Seedlot	38. Nurs.		
				Species	Type	Size	Age				
1 y	m d										
2 y	m d										
3 y	m d										

21. STAND TENDING HISTORY	Ref. No.	22. Tending comp. date	39. Base Meth.	40. Tech.	41. Method	42. Type	30. Kg ai/ha	31. L/ha ml/frill	32. Notch Space
Notes:	1 y	m d					.		
	2 y	m d					.		
	3 y	m d					.		
	4 y	m d					.		
	5 y	m d					.		

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

43. STOCKING STANDARDS "B" (SILVICULTURE PRESCRIPTION)

Ref. No.	Regen. Delay	Early Assess.	Late Assess.	Minimum Height by Species (cm)												% Above Brush
1																
2																
3																

Crop Tree/Non-Crop Tree Selection Criteria

Crop Trees

44. Species	45. Regen. Method	46. Layer	47. Special Selection Criteria	48. No/Grid Plot

Non-crop Trees

44. Species	45. Regen. Method	46. Layer	47. Special Selection Criteria	48. No/Grid Plot

*In Alberta, Obligation No. = agency short form for Timbermark/1996 for C.P./001 or block no./and number installations 01 - n.

21. STAND TENDING HISTORY	Ref. No.	22. Tending comp. date	39. Base Meth.	40. Tech.	41. Method	42. Type	30. Kg ai/ha	31. L /ha mU/frill	32. Notch Space
Notes:	1	20000817	BR	CA	HELI	VISION	1.78	100	
	2 y		m	d					
	3 y		m	d					
	4 y		m	d					
	5 y		m	d					

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

43. STOCKING STANDARDS "B" (SILVICULTURE PRESCRIPTION)

Ref. No.	Regen. Delay	Early Assess.	Late Assess.	Minimum Height by Species (cm)												% Above Brush
				F	d	i	P	i	L	S	x	B	I			
1	4	9	15	1	4	0	2	0	0	1	0	0	1	0	0	150
2																
3																

use 3

Crop Tree/Non-Crop Tree Selection Criteria

Crop Trees

44. Species	45. Regen. Method	46. Layer	47. Special Selection Criteria	48. No/Grid Plot
F d i	P	A 5	choose planted Fdi closest to grid point	1

Non-crop Trees

44. Species	45. Regen. Method	46. Layer	47. Special Selection Criteria	48. No/Grid Plot
B L	N	A 4	no basal sweep, leader length ≥ 10 cm, free from damage, closest to grid point.	1

Form: ADMINISTRATION AND SITE HISTORY DESCRIPTION

1. Agency	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
Canadian Forest Products - Chetwynd	CFPCD	
Canadian Forest Products - Clear Lake	CFPCL	
Canadian Forest Products - Isle Pierre	CFPIP	
Canadian Forest Products - Ft. St. James	CFPJA	
Canadian Forest Products - Ft. St. John	CFPJO	
Canadian Forest Products - Grand Prairie	CFPGP	
Canadian Forest Products - Netherlands	CFPND	
Canadian Forest Products - Polar	CFPPR	
Daishowa-Marubeni - Peace River/High Level/Brewster	DMI	
Dunkley Lumber Ltd.	DUNK	
The Pas Lumber Company Ltd.	EJ7PF	
Fletcher Challenge - Mackenzie	FCC806	
Finlay Forest Industries	FFIG06	
Millar Western - Boyle	MWB	
Millar Western - Whitecourt	MWW	
Ministry of Forests - Cariboo Region	MOFCR	
Ministry of Forests - Prince George Region	MOFPGR	
Ministry of Forests - Prince George District	MOFPGD	
Ministry of Forests - Prince Rupert Region	MOFPRR	
Northwood Pulp & Timber - Houston	NOPT1	
Northwood Pulp & Timber - Prince George	NOPT2	
Rustad Bros. & Co. Ltd. - North	RUSTN	
Rustad Bros. & Co. Ltd. - South	RUSTS	
Weldwood of Canada Ltd. - 100 Mile House	WW100M	
Weldwood of Canada Ltd. - Babine	WWBAB	
Weldwood of Canada Ltd. - Hinton	WWHIN	
Weldwood of Canada Ltd. - Houston	WWHOU	
Weldwood of Canada Ltd. - Quesnel	WWQUE	

July 17, 1996.

1. Agency	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
Weldwood of Canada Ltd. - Williams Lake	WWWIL	
West Fraser Mills Ltd.- Chetwynd Forest	WFCFI	
West Fraser Mills Ltd. - Fraser Lake	WFFL	
West Fraser Mills Ltd. - Pacific Inland	WFPIR	
West Fraser Mills Ltd. - Quesnel	WFQ	
West Fraser Mills Ltd. - Skeena	WFSKE	
West Fraser Mills Ltd. - Williams Lake	WFWL	
Weyerhaeuser - Drayton Valley/Edson/Slave Lake	WYRHSR	
Field Type: Character	Justification: left	
Sampling Standard: n/a	Example entry: Canadian Forest Products - Chetwynd	C A N F O R C D

1.a Province: Enter 'BC' for installations in British Columbia and 'AB' for installations in Alberta

2. Licence	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
Follow licence number format	one letter followed by five numbers	
Field Type: Character/Numeric	Justification: Left	
Sampling Standard: n/a	Example Entry: A18167	A 1 8 1 6 7

3. Obligation Number	Field Guide Pg.: n/a	Form: Admin.
The Obligation number consists of the Timbermark, the Cutting Permit, the Block, and the Installation number.		
Code Definition	Acceptable Codes	
Obtain components of correct Obligation number from Licensee or MOF District Office. Note: The Timbermark does not necessarily contain the C.P. no.		
Field Type: Character/Numeric	Justification: Right	
Sampling Standard: n/a	Eg. Entry: Timbermark EK3041; C.P. 41; Block 3; Installation no. 1	E K 3 0 4 1 0 0 4 1 0 0 3 0 1

4. Paired Plots		Field Guide Pg.: n/a		Form: Admin.												
Code Definition		Acceptable Codes														
Enter the Obligation number for the installation that is paired with this one.																
Field Type: Numeric		Justification: Right														
Sampling Standard: n/a	Example Entry: Timbermark EK3041; C.P. 41; Block 5; Installation no. 2	E	K	3	0	4	1	0	0	4	1	0	0	5	0	2

5. Forest Region/Forest District		Field Guide Pg.: n/a		Form: Admin.	
Forest Regions:					
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes		
Cariboo	CA	Prince George	PG		
Kamloops	KA	Prince Rupert	PR		
Nelson	NE	Vancouver	VA		
Forest Districts:					
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes		
Arrow	AR	Lillooet	LI		
Boundary	BO	Mid-coast	MC		
Bulkley	BU	Merritt	ME		
Cassiar	CA	100 Mile House	MH		
Cranbrook	CB	Mackenzie	MK		
Chilcotin	CH	Morice	MO		
Chilliwack	CK	North Coast	NC		
Clearwater	CL	Port Alberni	PA		
Campbell River	CR	Penticton	PE		
Dawson Creek	DC	Prince George	PG		
Duncan	DU	Port McNeill	PM		
Fort Nelson	FN	Queen Charlotte Islands	QC		
Golden	GO	Quesnel	QU		
Horsefly	HO	Revelstoke	RE		
Invermere	IN	Robson Valley	RV		
Fort St. James	JA	Salmon Arm	SA		
Fort St. John	JO	Sunshine Coast	SC		

Forest Districts:			
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Kamloops	KA	Squamish	SQ
Kispiox	KI	Vanderhoof	VA
Kootenay Lake	KL	Vernon	VE
Kalum	KM	Williams Lake	WL
Lakes	LA		
Field Type: Character		Justification: n/a	
Sampling Standard: n/a	Example entry: Cariboo Region, Williams Lake		C A W L

6. BCGS Mapsheet	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
Follow BCGS mapsheet format	082A001 - 114P100	
Field Type: Character/Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: 093J046	0 9 3 J 0 4 6

7. Ministry of Forests Opening Number	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
As assigned by the MOF for the mapsheet	001 to 999	
Field Type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: mapsheet 63	0 6 3

8. UTM Coordinates, Zone and NAD. (North American Datum)	Field Guide Pg.: n/a	Form: Admin.
This information can be obtained from either GPS or by reading off the appropriate maps. <i>UTM N between 5,000,000 & 7,000,000</i> <i>UTM E " 0 999,999</i>		
Code Definition	Acceptable Codes	
	6 or 7 digit Northings and Eastings code plus 2 digits for both grid zones and NAD.	
Field Type: Numeric	Justification: Right	
Sampling Standard: n/a		
Example entry: N 560,000 m, E 126,000 m, Zone 9, NAD 27.	5 6 0 0 0 0 1 2 6 0 0 0 9 2 7	

9. Elevation	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
elevation in meters above sea level	0-2000	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 50 m	Example entry: 890 m	8 9 0

10. Exposure Type	Field Guide Pg.: A-8	Form: Admin.
Code Definition	Acceptable Codes	
not applicable	N	
wind	W	
insolation	I	
frost	F	
cold air drainage	C	
salt spray	S	
atmospheric toxicity	A	
other delete	Ø	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: frost	F

11. Management Objective	Field Guide Pg.: n/a	Form: Admin.
Identify the management objective, other than timber production, for the treatment unit in which the installation is located, as specified in the SP.		
Code Definition	Acceptable Codes	
Forest Health (including protection from insects, disease and fire).	FH	
Wildlife	W	
Hydrology (ie. fish habitat and water quality)	H	
Riparian Management	RI	
Visual Quality	V	
Recreation	RE	
Biodiversity	B	
Cultural/Heritage	C	
Range Management	RA	

11. Management Objective		Field Guide Pg.: n/a	Form: Admin.
Identify the management objective, other than timber production, for the treatment unit in which the installation is located, as specified in the SP.			
Code Definition		Acceptable Codes	
Field type: Character		Justification: Left	
Sampling Standard: n/a	Example Entry: To produce an uneven-aged stand of Engleman spruce and Subalpine fir while maintaining habitat for Mountain cariboo.		W

12. Sampling Strategy & Installation Type		Field Guide Pg.: n/a	Form: Admin.
Code Definition		Acceptable Codes	
Random landscape representation		R RL	
Stratified random site group representation		R SG	
Stratified random treatment representation		R TR	
Non-random - paired plot		N PP	
Field Type: Character		Justification: Left	
Sampling Standard: n/a	Example entry: Random site group representation		R S G

add: non-random member interest NMI

13. Sampling Intensity		Field Guide Pg.: n/a	Form: Admin.
Code Definition		Acceptable Codes	
Enter the total number of hectares from which the installations were selected.		1 to 99999	
Field Type: Numeric		Justification: Right	
Sampling Standard: n/a	Example entry: 5227 ha		0 5 2 2 7

14. Reference Trees		Field Guide Pg.: n/a	Form: Admin.
Code Definition		Acceptable Codes	
species		See Stand Description Form, Cell Reference 9.	
diameter at stump height in centimeters		1-500	
distance in meters		0-15 m	
azimuth		0 to 360	
Field Type: Species - Character, Rest - Numeric		Justification: Species - Left, Rest - Right	

14. Reference Trees	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
Sampling Standard: azimuth $\pm$ 2 degrees, distance $\pm$ 0.1 m, diameter $\pm$ 0.1 cm or 1% whichever is greater.	Species:	P l i
Example Entry: Pine reference tree with a 33.5 cm diameter at stump height, with a distance of 4.48 m to the installation centre at 126°.	Diameter: at stump height	3 3 5
	Distance:	4 4 8
	Azimuth:	1 2 6

15. Inventory Label	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
Enter the inventory label as given on the SP for that Treatment Unit.		
Field Type: Character/Numeric	Justification: Left for species codes, Right for site index.	
Sampling Standard: n/a		
Example entry: Pli , Sw stand with a site index of 15.	P L I S W	1 5

16. Date Installed	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
year, month and day	between July 15 and September 15	
Field Type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: Sept 5, 1998	1 9 9 8 0 9 0 5

17. Initials of Recorders	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
initials	provide all 3	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: Andy P. Donut	A P D

18. Contractor	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
Up to 8 letters of the contractor's name.		
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: IFS	I F S

19. Installation Objective	Field Guide Pg.: n/a	Form: Admin.
Record specific objectives of an installation if not already described by the InstallationType. This is a written entry only and will not be used for any analysis.		
Field Type: Character	Justification: n/a	
Sampling Standard: n/a	Example Entry: To monitor the effects of excavator mounding on an ESSF wk1 08 site series, planted with Sw PSB 313 2+0.	

20. Installation Location	Field Guide Pg.: n/a	Form: Admin.
Give a brief but precise description of the installation location within the opening. It must include the point of commencement (POC), azimuth and distance to the installation centre and the azimuth and distance from the plot centre to another mappable or GPS'd point. This is important for relocation of the installation and to allow the installation to be incorporated into the GIS system. These are written comments only and will not be used in analysis.		
Field Type: Character/Numeric	Justification: n/a.	
Sampling Standard: azimuth ± 1 degree, distance ± 5 m.	Example entry: POC at NW corner of landing 7, 55 m at 315 degrees to Installation 01. From SW tip of swamp, 150 m at 270 degrees to installation centre.	

21. Activity Notes	Field Guide Pg.: n/a	Form: Admin.
Include any unusual or special information. This is a written comment only and will not be used for analysis.		
Field Type: Character/Numeric	Justification: n/a.	
Sampling Standard: n/a	Example entry: This block was sheep grazed in conjunction with planting.	

22. Activity Commencement and Completion Dates	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
Year, month, day		
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: June 18, 1995	1 9 9 5 0 6 1 8

23. Broad type of Disturbance	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
wildfire	B	
flood	F	
logging	L	
pest	P	
slide	S	
salvage	V	
windthrow	W	
other <i>delete</i>	O	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: logging	L

24. Type of Harvesting	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
conventional cable system	CAB	
sky line cable system	SKY	
skidder cable system	SKD	
handfall/grapple skidder	HGR	
feller buncher/grapple skidder	MGR	
handfall/line skidder	HLS	
feller buncher/line skidder	MLS	
low ground pressure	LGP	
horse skidding	HRS	
helicopter	HEL	
hoe chucking	HOE	
push over logging	POL	
other <i>delete</i>	OTH	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: Handfall/grapple skidder	H G R

add-

single or double-grip cut-to-length processor/forwarder
feller buncher / cut-to-length processor/forwarder

CTL
MCL

25. Type of Skidder	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
light tracked skidder	L	
low ground pressure	P	
standard rubber tire	S	
standard tracked skidder	T	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: Standard tracked skidder	T

26. Silvicultural System	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
clearcut logging	CCL	
coppice	COP	
diameter limit	DLC	
seed tree	SET	
shelterwood	SHW	
single tree selection	STS	
group selection	GTS	
patch retention	PTR	
wildfire	FRE	
salvage logging	SAL	
commercial thinning	THN	
other	OTH	
Field type: Character, all capitals	Justification: n/a	
Sampling Standard: n/a	Example entry: clearcut	C C L

27. Site Preparation Technique	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
biological	BI	
burn	BU	
chemical air	CA	
chemical ground	CG	

27. Site Preparation Technique	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
grass seeding	GS	
manual	MA	
mechanical	ME	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: sheep grazing	B I

28. Site Preparation Method		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
grazing	GRAZE	bracke	BRACM
broadcast burn	BURN	cable knockdown	CABLE
pile-and-burn burning piles	PBURN	chain drag	CHAIN
spot burn	SPOT	C & H plow	CHPLO
wildfire	WFIRE	leno model 77 or 81	LENO
windrow	WINDR	landing ripping	LRIP
fixed wing	FIXED	martinni plow	MARRI
granular	GRANU	hydraulic disc	MDISC
helicopter	HELI	machine knockdown	MDOWN
basal spray	BASL	mounding	MOUND
back pack application	BPACK	VH mulcher	MULCH
EZ-ject stem injection	EZJEC	machine patch scarifier (excavator or Hawke scarifier only)	PATCH
notch or frill individual tree	FRILL	passive disc trencher	PDISC
stem injection	SINJE	piling	PILE
hand site preparation	HANDP	stump treatment	STUMP
3 metre knockdown	KNOCK		
snag falling	SNAG	V-plow	VPLOW
blading	BLADE	vehicle mounted sprayer (fixed boom)	VMSFB
hydroaxe	HYDRO	vehicle mounted sprayer (sprayer hose)	VMSGH
shark fin drag	SHARK		

add - ripper plow

July 17, 1996.

vehicle mounted spreader

RPCS

VMSPR

28. Site Preparation Method		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: broadcast burn	B B U R N

29. Site Preparation Type		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Prime mover/machine		forestamine (2,4-D amine)	FOREST
excavator	EXCAV	silvamine 500	SIL500
skidder	SKIDR	weedone	WEEDCB
FMC	FMC	velpar liquid (hexazinone)	VELPL
bracke moulder	BRACKE	velpar granules (hexazinone)	VELPG
crawler tractor	CRAWL	pronone 5G (hexazinone)	PRO5
hawk scarifier	HAWK	pronone 10G (hexazinone)	PRO10
chain saw	CSAW	Biological	
Donaren moulder	DonARE	clover	CLOVR
Chemical		grass	GRASS
vision (glyphosate)	VISION	sheep	SHEEP
for-ester (2,4-D ester)	FOR-ES	cattle	CATTL
esteron 600 (2,4-D ester)	EST600		
formula 40F (2,4-D amine)	FORM40		
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: sheep grazing	S H E E P

30. Kg a.i./ha (active ingredient per hectare)		Field Guide Pg.: n/a	Form: Admin.
Code Definition		Acceptable Codes	
kg a.i./ha		enter number with decimal point	
Field type: Numeric		Justification: Right	
Sampling Standard: As per application rate.		Example entry: using vision 1.42 kg a.i./ha.	1 4 2

31. Litres of solution/hectare or ml solution/frill	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
Rate (mix per hectare).	number greater than 0	
Field type: Numeric	Justification: Right	
Sampling Standard: As per application rate.	Example entry: Vision @150 L/ha	1 5 0

32. Space Between Notches	Field Guide Pg.: n/a	Form: Admin.
Enter the space between notches for stem injection, notch or frill individual trees, or hydroaxe methods.		
Code Definition	Acceptable Codes	
Distance in cm. ...		
Field type: Numeric	Justification: Right	
Sampling Standard: Average distance $\pm$ 1 cm	Example entry: 5 cm	0 5

33. Stocking Standards "A"		Field Guide Pg.: n/a	Form: Admin.
Identify the appropriate stocking standards from the Pre-Harvest Silviculture Prescription or Silviculture Prescription. These particular standards are necessary for selecting crop trees in the field.			
Code Definition		Acceptable Codes	
minimum spacing		as per PHSP or SP	
target sph		as per PHSP or SP	
minimum sph		as per PHSP or SP	
preferred species		enter valid species code, see Stand Description Form, cell 9	
acceptable species		enter valid species code, see Stand Description Form, cell 9	
Field type: Spacing and sph - Numeric; species - Character		Justification: Numeric - Right, Character -Left	
Sampling Standard: n/a	Example entry: Preferred is Pli with a target of 1200 sph, minimum 700 sph ,a minimum spacing of 1.6 m	1 6 1 2 0 0 7 0 0 P 1 1	

34. Regeneration Technique		Field Guide Pg.: n/a	Form: Admin.
Code Definition		Acceptable Codes	
fill planting		FP	
manual		MA	
mechanical		ME	
direct seeding		DS	
Field type: Character		Justification: n/a	
Sampling Standard: n/a		Example entry: fill plant	F P

35. Regeneration Method		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
bareroot	BROOT	helicopter	HELI
container	CTAIN	hand spot seeding	SPOTS
whips	WHIP	cyclone seeder	CSEED
auger	AUGER	furrow seeder	FUROW
fixed wing	FIXED	snowmobile	SNOW
cones	CONE	vehicle mounted slinger	VMSLI
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: Container stock	C T A I N

36. Stock Type		Field Guide Pg.: n/a	Form: Admin.
Code Definition		Acceptable Codes	
Species		as per planting records	
Type		as per planting records	
Size		as per planting records	
Age		as per planting records	
Field type: Size and age - Numeric; Species and type - character		Justification: Numeric - Right; Character - Left	
Sampling Standard: n/a	Example Entry: Cw PSB 313B 1+0	C w	P S B 3 1 3 B 1 + 0

37. Seedlot	Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	
MOF seedlot number		
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: Seedlot # 2853	2 8 5 3

38. Nursery		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Arbutus Grove	AG	Nuu-Chah-Nulth	NC
Arbordale Nursery	AR	Not given	NG
Busy Bee Nursery	NN	North Road Lab	NR
Balco Nursery	BC	Northwood	NW
Canadian Forest Service	CF	Pelton	PL
Chilliwack	CH	Peace River Greenhouses	PR
Canadian Pacific Forest Products	CP	Reid-Collins	RC
Campbell River	CR	Ruffs Greenhouses	RG
Daveron Nursery Ltd.	DR	Rose Rim Nursery	RM
Elmore	EM	Red Rock	RR
Fletcher Challenge Canada	FC	Skimikin	SK
Green Timbers	GT	Sorrento Nursery	SO
Hi-Gro Silva Nursery	HG	Surrey	SR
Hammer Enterprises	HM	Silvertip	ST
Harrop	HR	Summit Nursery Ltd.	SU
Heffley Creek	HF	Sylvan Vale	SV
Hybrid Nursery Ltd.	HY	Thornhill	TH
Industrial Forestry Service	IF	Telkwa	TK
Jaro Forest Service	JR	UBC Nursery	UB
K and C Silviculture Farms	KC	Valentine Farm	VA
Kalum Forest Nursery	KN	Vernon	VR
Koksilah	KO	Woodmere Nursery Ltd.	WD
Kalamalka Research	KR	West Fraser	WF
Macmillan Bloedel	MB	Weyerhauser	WY

38. Nursery		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Malaspina College	MC	Yellow Point	YP
Mesachie Lake	ML		
Mountainview Valley Farms	MV		
MOF Puckle Rd. Nursery	MY		
Field type: Character	Justification: n/a		
Sampling Standard: n/a	Example entry: Harrop		H R

ADD 3BA Season of Plantings: spring (cold stored) summer (not stored) Sp Su Fall (not stored) winter (not stored) Fa Wi

39. Stand Tending Base Method		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes		
brushing	BR		
fertilization	FE		
juvenile spacing/sanitation spacing	JS		
pruning	PR		
seedling protection	SP		
insect/disease control	ID		
Field type: Character	Justification: n/a		
Sampling Standard: n/a	Example entry: brushing		B R

40. Stand Tending Technique		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes		
biological	BI		
chemical air	CA		
chemical ground	CG		
burn	BU		
manual	MA		
mechanical	ME		
seedling protection	SE		
Field type: Character	Justification: n/a		
Sampling Standard: n/a	Example entry: burn		B U

38. Nursery		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Arbutus Grove	AG	North Road Lab (MOF)	NR
Arbordale Nursery	AR	Northwood Pulp & Timber	NW
Beaverlodge (PRT)	BL	Pelton Reforestation	PL
Bonneyville	BO	Peace River Greenhouses	PR
Canadian Forest Service	CF	Reid-Collins (PRT)	RC
Chinook	CH	Ruff's Greenhouses	RG
Pacific Forest Products	CP	River Heights (R&L Greenhouses)	RH
Campbell River (PRT)	CR	Ross Lake Nursery	RL
Woodmere Nursery Ltd. Fairview	FV	Rose Rim Nursery	RM
Green Timbers (MOF)	GT	Red Rock (PRT) Prince George	RR
Hi-Gro Silva Nursery	HG	Skimikin (MOF)	SK
Hammer Enterprises	HM	Smokey Lake	SL
Harrop (PRT) ---	HR	Sorrento Nursery	SO
Hybrid Nursery Ltd.	HY	Surrey (MOF)	SR
Industrial Forestry Service	IF	Summit Nursery Ltd. (PRT)	SU
Jaro Forest Services Ltd	JR	Sylvan Vale	SV
K and C Silviculture Oliver	KC	Tremel Greenhouses	TG
Kalum Forest Nursery	KN	UBC Nursery	UB
Kalamalka Research (MOF)	KR	Vernon (PRT)	VR
Macmillan Bloedel	MB	Woodmere Nursery Ltd. Telkwa	WD
Malaspina College	MC	Water Valley Forest Nursery	WV
Red Rock Medicine Hat	MH	Weyerhaeuser Armstrong	WY
Mesachie Lake	ML	Yellow Point Propagation	YP
Mountain View Growers Inc.	MV		
Field type: Character		Justification: n/a	
Sampling Standard: n/a		Example entry: Harrop	H R

Add to your
 TRENDS manual
 as temporary
 fix. Jan. 9, 1998.

January 7, 1998

Alberta Seedlot numbers for *TRENDS*©: How to record box 37, Administration and Site History Description

Alberta seedlot numbers are composed of:

owner|township|range|meridian|year of collection|species

Since species is already recorded in cell 36., on the same record line of the Administration and History Form, species does not have to be repeated. A link between species and seedlot numbers should be built into the database tables. The seedlot identifying number can be recorded above cell 37., in the space beside the title of Artificial Regeneration and History and Source until the forms are revised. The components of a seedlot number will always be recorded in the order above using:

4 spaces|3 spaces|2 spaces|1 space|2 spaces

This means that zero-filling by the recorded is required in order to keep the components in the same place for identification. The seedlot identifying number will be retained in the database as a single item, not by component.

Below are examples of what an Alberta seedlot number should look like:

The owner is CanFor - Grande Prairie, township is 61, range is 3, meridian is 6, and year is 1988.

C	F	G	P	0	6	1	0	3	6	8	8
---	---	---	---	---	---	---	---	---	---	---	---

The owner is Millar Western, township is 58, range is 14, meridian is 5, and year is 1986.

M	W			0	5	8	1	4	5	8	6
---	---	--	--	---	---	---	---	---	---	---	---

41. Stand Tending Method		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
backpack application	BPACK	machine knockdown	MDOWN
blading	BLADE	microorganism	MICRO
42 → brush saw	BRUSH	motorized cutting	MOCUT
chain drag	CHAIN	motorized girdling	MOGIR
cover crop	COVER	mulching	MULCH
Ezject stem injection	EZJEC	not applicable	N/A
fixed wing	FIXED	extension pole	POLE → 42
granular application	GRANU	power saw	POWER
grazing	GRAZE	stem bark spraying	SBARK
hand pulling (removal)	HANDR	sepi	SEPI
42 → handsaw	HANDS	pruning shears	SHEAR → 42
helicopter	HELI	stem injection	SINJE
hydro-axe	HYDRO	spot gun application	SPGUN
insect	ISECT	stump treatment	STUMP
manual cutting	MANCT	Tubex tubing	TUBEX
manual girdling	MANGI	Vexar tubing	VEXAR
manual stem bending	MANUSB	vehicle mounted sprayer (fixed boom)	VMSFB
marden chopper	MARDEN	vehicle mounted sprayer (gun and hose)	VMSGH
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: helicopter	H E L I

42. Stand Tending Type		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Prime mover		Biological	
crawler prime mover	CRAWL	cattle	CATTL
FMC	FMC	clover	CLOVR
skidder	SKIDR	grass	GRASS
Chemical		sheep	SHEEP
any 6 number code representing a fertilizer (ex. 20-10-10)	ex. 201010	Hand tools	

42. Stand Tending Type		Field Guide Pg.: n/a	Form: Admin.
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Esteron 600 (2,4 D ester)	EST600	Brush hook	BRHOOK
For-ester (2,4 D ester)	FOREST	chain girdler (Beaver)	CHAIN
Forestamine (2,4 D amine)	FORAMI	chainsaw	CSAW
Formula 40F (2,4 D amine)	FORM40	hatchet	HATCH
Glowon (MSMA)	MSMA	hockey stick	HOCKEY
Pronone 5G (hexazinone)	PRO5	knife	KNIFE
Pronone 10G (hexazinone)	PRO10	Kyuquot girdler	KYUQUO
Silvamine 500 (2,4 D amine)	SIL500	machete	MACHET
sewage sludge	SLUDGE	sandvik	SANDV
Velpar granules (hexazinone)	VELPGR	scorp (girdling tool)	SCORP
Velpar liquid (hexazinone)	VELPL	shear	SHEAR
Vision (glyphosate)	VISION	Vredenburg girdler	VREDEN
Weedone CB (2,4-DP)	WEEDCB		
Field type: Character and/or Numeric		Justification: Left	
Sampling Standard: n/a		Example entry: clover	C L O V R

43. Stocking Standards "B"		Field Guide Pg: n/a	Form: Admin.												
Identify the appropriate stocking standards from the Pre-Harvest Silviculture Prescription or Silviculture Prescription. These particular standards are required for determining whether or not trees have met free growing standards.															
Code Definition	Acceptable Codes														
regen delay	No. of years														
early assessment	No. of years 2 cells														
late assessment	No. of years														
minimum height by species	Enter species on the top line and height requirement (cm) below.														
% above brush	%														
Field type: Numeric	Justification: Right														
Sampling Standard: n/a															
Example entry: regen delay 4 years, early assessment 9 years, late assessment 15 years, minimum height for pine 2.0 m, other species 1.8 m, % above brush 150%.		<table border="1"> <tr> <td>P</td><td>L</td><td>I</td><td>O</td><td>T</td><td>H</td> </tr> <tr> <td>4</td><td>9</td><td>15</td><td>200</td><td>180</td><td>150</td> </tr> </table>		P	L	I	O	T	H	4	9	15	200	180	150
P	L	I	O	T	H										
4	9	15	200	180	150										

44. Enter the appropriate species as per the list given for cell 9 on the Stand Description Form.

45. Regeneration Method	Field Guide Pg: n/a	Form: Admin.
Identify the appropriate regeneration method for the crop tree to be chosen.		
Code Definition	Acceptable Codes	
Planted	P	
Natural	N	
Advanced	A	
Field type: Character	Justification: Right	
Sampling Standard: n/a	Example entry: select a planted Pl	P

46. Layer	Field Guide Pg: D-1 to D-2	Form: Admin.
Identify the appropriate layer for the crop tree to be chosen.		
Code Definition	Acceptable Codes	
Dominant	A1	
Main Canopy	A2	
Poles	A3	
Sapling	A4	
Seedling	A5	
Field type: Character/Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: select an advanced sapling	A 4

47. Special Selection Criteria	Field Guide Pg: n/a	Form: Admin.
Identify any special criteria necessary for selecting crop or non-crop trees, e.g. specific leader length, form or age criteria, etc.		
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: select advanced B1 saplings having good form, i.e. no basal sweep, a leader length of at least 10 cm and free from damaging agents.	

48. Enter the number of individuals that should be chosen at each grid point, if they are available.

Stand Description

Updates to TRENDS Protocol, June 15, 1998

Stand Description

Cell 17. Damaging Agent/Condition
delete
Diseases D
Insects I
Treatment injuries T
Vegetation problems V
Note: These damaging agents must be coded to at least a 2-letter code.
change
Tree Condition not limited to layers A0 - A3 because these codes are also used on Subplot form for layers (A4-A6)

Site Index

See write-up. This form and protocol are to be used if the stand is simple or moderate vertical structure. If complex structure, still do Multi-story Heights and Ages form.

Root Disease Information

Add a bullet to the pre-harvest instructions:
• map trees on Installation Diagram

Multi-story Heights and Ages

See write-up, Pre-harvest 2nd bullet. Measure and age trees from within the 30m x 30m plot. As for Site Index, if trees are selected outside of the stand description cruise plot radius, number them consecutively starting from S901.

Quadrant Description

Cell 7. Aspect
Change
Range = 1-360

Vegetation Description

Cell 7. Vegetation species
add
when assessing by layer (B1, B2, C, D) record LAYER
check
Exceptions list for vegetation species that do not follow the 4/3 rule for genus and species or where the same plant is known by more than one latin name. This list is posted on the NIVMA homepage in Access97. Go to <http://www.nivma.bc.ca>; click on "Forum"; scroll down past Table of Contents to NIVMA e-mail section; double-click the hot link to NIVMA FTP site; there find the exceptions plant list "TRENDS PLANT LIST EXCEPTIONS.mdb"; click-on to download. If you cannot ever, in any way, no how, not possible in this lifetime, access this site, please contact the Association c/o Alvina Derksen at Industrial Forestry Service Ltd. (250-564-4115) and we will snail-mail you something you can use!

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

Timbermark

C.P.

Block

Installation

2. Measurement Date

y			m	d	
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3. Initials of Recorders

[illegible]

4. Contractor

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	52
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5. Harvest				
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6. Card

1 of 1

[illegible]16. Plot radius*

3

* NOTE: use - 11.28 m, 13.80 m or measure the whole installation, to capture a minimum of 60 trees in total, i.e., not for each species.

* NOTE: If you measure every tree in the installation, record 16.93 for plot radius. (A circular plot of 16.93 m covers 0.09 ha, the same area as the square 30m X 30m installation.)

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

A B 3 0 9 4 | 9 4 | 2 | 1

y 1 9 9 7 m o 7 2 1

A P E D A J

6. Card

4. Contractor

5. Harvest P R E

1 of 2

P I C E A

7.	8. Tree #	9. Species	10. DBH (cm) = to or >7.5cm	11.	12.	13. Radial	14.	15. Accept.	
Quad.				Estimated	% Live	Crown	Vigour	for partial	
No.				Height (m)	Crown	Width (m)		harvest only	
1	S	O	O	1	7.7	14.0	50	0.7	2
				2	9.7	6.5	60	1.6	3
				3	12.6	6.0	70	1.7	2
				4	1.8	8.0	0	0.0	1
				5	12.7	12.0	60	1.4	3
				6	19.5	12.0	70	1.6	2
				7	27.8	19.0	0	0.0	1
				8	26.7	17.0	80	1.6	3
				9	13.4	10.0	50	0.8	3
				10	17.0	15.0	60	2.0	3
				11	11.0	8.0	30	1.1	2
				12	10.7	9.0	60	0.9	3
				13	11.9	11.0	50	1.0	3
				14	7.9	7.5	40	0.7	3
				15	14.1	12.2	50	1.5	3
				16	16.3	13.1	50	0.7	3
				17	30.0	26.3	70	1.4	2
				18	8.1	7.0	30	1.2	3
				19	10.6	9.0	30	0.6	2
				20	11.2	9.0	50	1.0	2
				21	42.1	27.8	40	1.4	3
				22	49.6	27.8	60	5.1	3
				23	35.8	27.1	50	1.7	3
				24	9.9	8.0	10	1.1	2
				25	11.8	13.0	10	1.1	2
✓				26	38.1	25.1	50	1.9	3
				27	35.1	23.3	60	2.1	3
2				28	18.0	15.2	60	0.8	2
1				29	21.8	16.0	0	0.0	1
				30	35.2	27.5	70	1.3	3
				31	30.0	21.0	50	1.1	2
				32	39.6	26.3	40	2.0	2
				33	36.2	20.8	40	2.3	2
				34	19.4	18.3	30	1.1	3
				35	10.0	9.0	20	0.8	2
				36	39.1	28.0	50	1.6	3
				37	11.5	8.0	40	1.2	3
				38	40.0	26.1	40	1.8	2
				39	23.3	16.2	0	0.0	1
				40	9.8	6.0	50	1.3	2
				41	41.4	28.7	60	1.4	3
				42	16.5	17.0	0	0.0	1
				43	43.4	27.0	70	1.8	3
✓	✓	✓	44	11.2	10.0	20	0.7	2	

16. Plot radius*

11.28

* NOTE: use - 11.28 m, 13.80 m or measure the whole installation, to capture a minimum of 60 trees in total, i.e., not for each species.

* NOTE: If you measure every tree in the installation, record 16.93 for plot radius. (A circular plot of 16.93 m covers 0.09 ha, the same area as the square 30m X 30m installation.)

STAND DESCRIPTION for TRENDS®

Page 1 of 2

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

5. Harvest

P	R	E	
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6. Card

 of

4. Contractor

P	I	C	E	A		
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[illegible]

STAND DESCRIPTION for TRENDS®

Page 2 of 2

STAND DESCRIPTION

Stand description information is collected on a circular plot with the installation centre as its centre. The size of this plot is dependent on the density of the stand in question. Choose one of the plot radii listed on the *Stand Description* form so that at least 60 trees ≥ 7.5 cm dbh will be included within the plot. Enter the plot radius used in the appropriate cell on the *Stand Description* form. If you measure every tree in the installation, record 16.93 for plot radius. A circular plot of 16.93 m covers 0.09 ha, the same area as the square 30 m X 30 m installation. If there are not 60 trees in the whole installation, just measure and record all the trees that you have.

- Number and record every tree within the stand description plot, dead or alive, as long as it is free standing (self-supporting) and ≥ 7.5 cm dbh. Record the trees by quadrant on the *Stand Description* form. Borderline trees are determined to be in or out of the plot by the estimated location of the point of germination.
- Number the trees consecutively throughout the plot, i.e. do not start again at number 1 each time you cross over into a new quadrant. It will be apparent which trees are within which quadrant as you fill out the quadrant number for each tree. On the form, overstory trees must be identified by the prefix "S" followed by zeros and the tree number so that all four cells of the record are filled, e.g. tree number 12 would be written on the form as "S012". However, only the numerical value need be painted on the tree; e.g., the same tree would have "12" painted on it.
- Paint a number on each tree above the dbh mark.
- Enter the species of the tree as per the codes given in the *Stand Description* tables.
- Record the dbh. **Dbh must always be taken 1.3 m above the ground on the high side of the tree.** For consistency, always use a stick, marked at 1.3 m to accurately locate breast height. Paint a line where dbh was taken.
- Record an estimate of the height for each tree. **Estimated heights must be estimated**, that is without checking yourself by actually measuring a tree now and then throughout the installation. If you want to "calibrate" your eye before doing your height estimates, go outside the installation and actually measure some trees out there so as not to bias any of the estimates made inside the installation.
- Record the percent live crown and the radial crown width for each tree.
- Record the vigour for each tree. Note the new vigour codes to be used starting in 1997 in the *Stand Description* tables.
- Acceptability is only to be completed for stands where partial harvesting is planned.
- Record any damaging agents according to the codes given in the *Stand Description* tables. If conditions exist that cannot be attributed to a specific damaging agent, record any condition codes that are applicable.
- Each set of damaging agents has its own type of severity code. Be sure to check the *Stand Description* tables for the severity code that matches the damaging agent that you have recorded.

Please note: All root diseases must be recorded as damaging agents on the *Stand Description* form; however, Tomentosus and Armillaria root diseases must also be recorded on the *Root Disease Information* form.

9. Species		Field Guide Pg.: Not D-5	Form: Stand Description
Code Definition		Acceptable Codes	
Paper birch	Betula papyrifera Marsh.	Ep	
Douglas-fir - interior variety	Pseudotsuga menziesii var. glauca (Beissn.) Franco	Fdi	
Douglas-fir - coastal variety	Pseudotsuga menziesii (Mirb.) Franco var. menziesii	Fdc	
Mountain hemlock	Tsuga mertensiana (Bong.) Carrière	Hm	
Western hemlock	Tsuga heterophylla (Raf.) Sarg.	Hw	
Alpine larch	Larix lyallii Parl.	La	
Tamarack	Larix laricina (Du Roi) K. Koch	Lt	
Western Larch	Larix occidentalis Nutt.	Lw	
Whitebark pine	Pinus albicaulis Engelm.	Pa	
Limber pine	Pinus flexilis James	Pf	
Jack pine	Pinus banksiana Lamb.	Pj	
Lodgepole pine - interior variety	Pinus contorta Dougl. ex Loud. var. latifolia Engelm.	Pli	
Lodgepole pine - coastal variety	Pinus contorta Dougl. ex Loud. var. contorta	Plc	
Western white pine	Pinus monticola Dougl. ex D. Don	Pw	
Ponderosa pine/ Yellow pine	Pinus ponderosa P. Laws. ex C. Laws.	Py	
Black spruce	Picea mariana (Mill.) BSP	Sb	
Sitka spruce	Picea sitchensis (Bong.) Carrière	Ss	
Engelmann spruce	For Alberta only Picea engelmannii Parry ex Engelm.	Se	
White spruce	For Alberta only Picea glauca (Moench) Voss	Sw	
Interior spruce = white, Engelmann and hybrids	For BC only	Sx	
Willow	Salix sp.	W	
Yellow cedar	Chamaecyparis nootkatensis (D. Don) Spach	Yc	
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: Interior Lodgepole pine	P : : 1 : : 1

14. Vigour		Field Guide Pg.: Not D-6	Form: Stand Description
Code Definition		Acceptable Codes	
Alive; will likely survive to be of crop tree quality.		3	
Alive; will not likely survive to be of crop tree quality. (Note: damaging agents must be recorded for trees with this vigour code).		2	
Dead		1	
Missing		0	
Field type: Character		Justification: n/a	
Sampling Standard: n/a	Example Entry: a mature tree that, if left unharvested, would likely continue to be of crop tree quality.		3

15. Crop Tree Acceptability		Field Guide Pg.: A-3	Form: Stand Description
In partial cutting systems, assess the tree's acceptability as a leave tree. This is not related to wildlife tree considerations.			
Code Definition		Acceptable Codes	
acceptable - live crown ratio > 50% (> 40% for Fd); stem free of rots, physical defects or pathological indicators; species ecologically suited to site as per regional guidelines.		a	
not acceptable - live crown ratio < 50% (< 40% for Fd); stem contains physical defects or pathological indicators; species not ecologically suited to site as per regional guidelines.		n	
In clear cut systems, cross the column off your form			
Field type: Character		Justification: n/a	
Sampling Standard: n/a	Example Entry: acceptable leave tree		a

16. Plot radius (m)		Field Guide Pg.: n/a	Form: Stand Description
Code Definition		Acceptable Codes	
Smallest plot size is 11.28 m radius plot; if the plot does not contain 60 trees total, go to a 13.80 m radius plot; if there are still not 60 trees, use the whole installation and record a radius of 16.93 m, which is the radius of a circle with the equivalent area to the square installation.		11.28, 13.80, or 16.93	
Field type: Numeric		Justification: n/a	
Sampling Standard: n/a	Example entry: 11.28 m		1 1 2 8

17. & 18. Damaging Agents, Tree Condition Codes & Severity Ratings			Field Guide Pg: D7-D9	Form: Stand Description	
Damaging Agents	Damage Code	Severity Rating	Severity Code		
LEADER OR BRANCH DIEBACK dermea canker <i>Dermea pseudotsugae</i> red flag disease <i>Potebniamyces balsamicola</i> phomopsis canker of Douglas-fir <i>Phomopsis lokoyae</i> sydowia tip dieback <i>Sclerophoma pithyophila</i> aspen-poplar twig blight <i>Venturia</i> spp. (Shepherd's Crook)	DL DLD DLF DLP DLS DLV	Enter percentage of crown infected.	1-100		
DWARF MISTLETOES Douglas-fir dwarf mistletoe <i>Arceuthobium douglasii</i> larch dwarf mistletoe <i>Arceuthobium laricis</i> lodgepole pine dwarf mistletoe <i>Arceuthobium americanum</i> hemlock dwarf mistletoe <i>Arceuthobium tsugense</i>	DM DMF DML DMP DMH	See Figure A4.2 ² for Hawksworth's 6-class rating system for all species and: Stem Swelling Defect class for coastal western hemlock ≥ 1 minor stem swelling per tree ≥ 1 major stem swelling per tree	1-6 N M		
ROOT DISEASES armillaria root disease <i>Armillaria ostoyae</i> black stain root disease <i>Leptographium wagenieri</i> laminated root rot, cedar strain <i>Phellinus weirii</i> laminated root rot <i>Phellinus weirii</i> annosus root disease <i>Heterobasidion annosum</i> rhizina root disease <i>Rhizina undulata</i> schweinitzii butt rot <i>Phaeolus schweinitzii</i> tomentosus root rot <i>Inonotus tomentosus</i>	DR DRA DRB DRC DRL DRN DRR DRS DRT	- Light crown symptoms - Severe crown symptoms - Dead - Basal resinosis (light) ≤ 50% - Basal resinosis (severe) > 50% - Butt rot - Confirmatory symptoms: stains, decay, mycelia, rhizomorphs or sporophores When <i>armillaria</i> or <i>tomentosus</i> root diseases are suspected in the pre-harvest stand, be sure to also complete the <i>Root Disease Information</i> form. In the case of <i>tomentosus</i> , make sure that the stumps are checked again post-harvest.	LC SC D RL RS BR CS		

² Forest Productivity Councils of British Columbia and BC Ministry of Forests, Inventory Branch, 1993. Minimum Standards for the Establishment and Remeasurement of Permanent Sample Plots in British Columbia. Forest Productivity Councils of BC and BC Min. For., Inventory Branch, Victoria, BC.

Site Index

1. Obligation No.

2. Measurement Date

A vertical number line with tick marks. The tick mark at the bottom is labeled y . Above it is a tick mark labeled m . Above that is a tick mark labeled d . There are several more tick marks above d , but they are not labeled.

3. Initials of Recorders

4. Contractor

Trial	Control	MCI	AD
1	95	85	75
2	95	85	75
3	95	80	70
4	95	78	68
5	95	75	65

Target number of Top Height Trees

for each Major Species (20% by basal area)

by Site Index Subplot Size (radius/hectares).

11.28 m / 0.04	13.80 m / 0.06	16.93 m / 0.09
----------------	----------------	----------------

6 trees

(Entire installation)

Site Index Measurement Trees

[illegible]

Calculated
horizontal distance (m)

[illegible]

1. Obligation No.

Timbermark C.P. Block Installation

Block

Installation

2. Measurement Date

2. Measurement Date 11/9/97 mm/dd/yy

3. Initials of Recorders

G	T	O	A	M	X
---	---	---	---	---	---

4. Contractor

S	I	L	V	I			
---	---	---	---	---	--	--	--

5. Harvest

W
A
A

Target number of Top Height Trees for each Major Species (20% by basal area) by Site Index Subplot Size (radius/hectares).		
11.28 m / 0.04 4 trees	13.80 m / 0.06 6 trees	16.93 m / 0.09 9 trees (Entire installation)

Site Index Measurement Trees

[illegible]

Calculated

horizontal distance (m)

$$\begin{array}{r} 30 \times 986 = 29.6 \\ \times 993 = 29.8 \\ \times 997 = 29.9 \\ \times 984 = 29.5 \\ \hline \quad \quad \quad 30.0 \\ \times 992 = 29.8 \\ \times 992 = 29.8 \\ \times 984 = 29.5 \end{array}$$

SITE INDEX

The *Site Index* form should only be used if the stand is suitable. Installations from which Site Index information is collected should be away from non-forest influences such as roads, gravel pits, or power lines. A buffer of about 30 m or the height of dominant trees in the stand should separate the installation from any non-forest influences. Use the following vertical structure classification as an aide in determining suitability¹:

Simple: -stands tend to be even in height with limited coverage in up to two other layers (A0 and A1, A2, A3, A4, A5; NIVMA Field Guide reference D1).

Moderate: - stands tend to be uneven in height with > 10% of the total crown coverage in each of three layers.

Complex: - stands are uneven in height with > 10% of the total coverage in each of four or five layers.

Complete the *Site Index* form only for stands with simple vertical structure. If the stand structure is moderate or complex, it is likely that the assumptions on which the site index method is based (i.e: that the stand is homogeneous, even-aged, unsuppressed, and undamaged) do not hold. **If the stand has moderate or complex vertical structure complete the *Multi-story Heights and Ages* form.**

- For each major species (> 20% of stand composition by basal area) measure the number of **Top Height Trees** specified in the chart on the *Site Index* form to get an estimate of site index. For example, if it is felt that there are four trees of a major species in an 11.28 m radius plot that meet the **Top Height criteria** below, then only those four trees need to be measured to provide a reliable estimate of site index for that species. The radius of plot required may be different for each major species depending on its distribution throughout the installation. In addition, in order to find enough **Top Height Trees**, it may be necessary to use a plot radius larger than that used for the *Stand Description*. Note that the possible radii to choose from are 11.28m, 13.8m or the whole square installation, which is represented by recording a radius of 16.93 m. **Do not go outside the installation to find Top Height Trees.**

A Top Height Tree must meet all of the following criteria²:

- 1) alive.
 - 2) have good vigour.
 - 3) no evidence of damage affecting height growth (check cores and tree form for evidence of past damage).
 - 4) no evidence of past suppression (check cores and tree form for evidence of past suppression).
 - 5) dominants and codominants.
 - 6) the largest diameters (at breast height) within the stand.
 - 7) not veterans.
 - 8) can be accurately measured for breast height age.
- It is possible that there may not be any trees on the installation that are suitable Top Height Trees. If you believe this to be the case, include a note of explanation on the *Site Index* form.
 - Record the layer and the tree number for each tree. If site index trees are chosen outside of the stand description cruise plot radius, number them consecutively starting from 901.

¹ Vegetation Resources Inventory Sampling Procedures. British Columbia Ministry of Forests, Resources Inventory Branch. Revised May 14, 1996.

² Top Height criteria from: Soderberg, U., and Nigh, G. 1994. Top Height Definition. A report to the technical advisory committee, Forest Productivity Councils of British Columbia.

- Take an age at breast height (1.3m).
- Ensure that an accurate ring count is made on all cores. **Ring counts should be done indoors on properly mounted and polished cores.** For transport from field to office cores should be stored in appropriate diameter plastic drinking straws with the ends stapled, not folded or taped. This will allow the cores to dry in the straw and prevent decomposition. Place the straws in a rigid container to prevent breakage during transport.
- The 10 and 20 year lengths on increment cores (cells 9 and 10) must be measured while the cores are fresh, ideally in the field when the cores are taken.
- Record the total length of the core and the length of any rot.

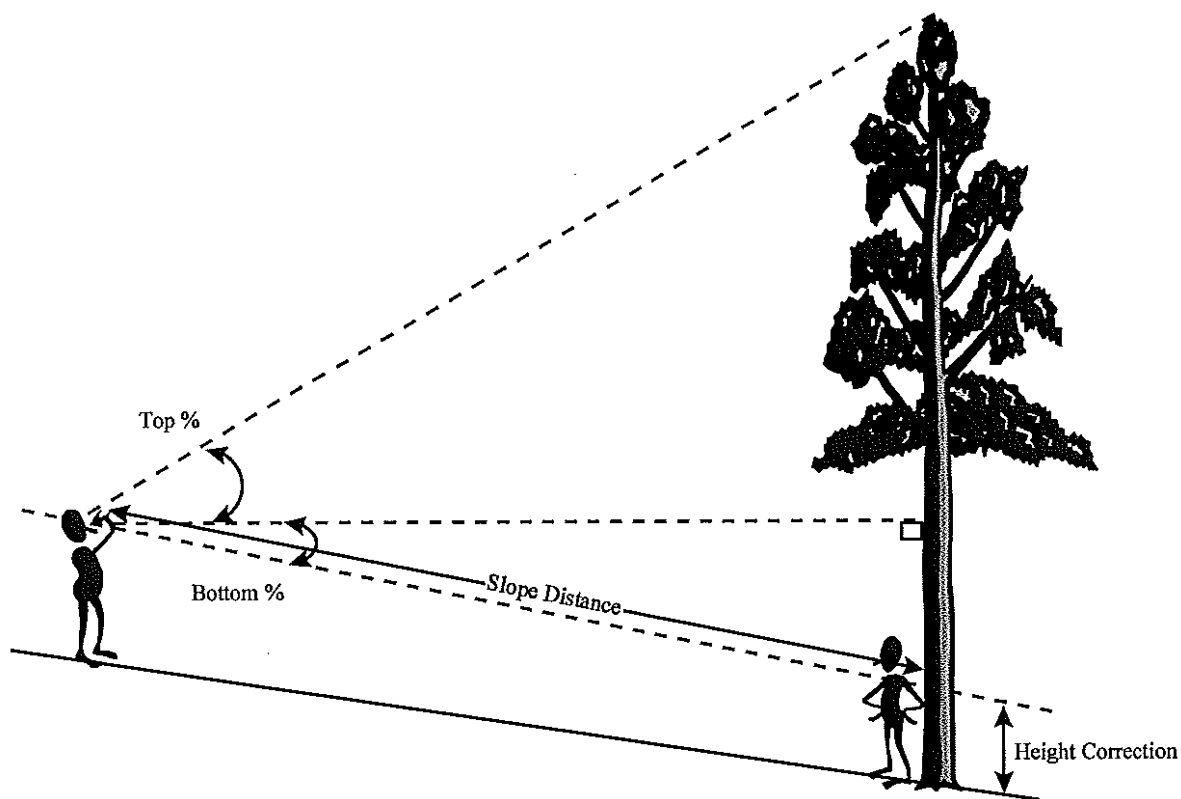


Figure 1. Tree height measurement parameters.

Notes on height measurement:

- Do not exceed 100% in the top reading if you are using a clinometer.
- If you are using a laser height measuring device, you need only record the height; however, be sure to make note of the equipment you used on the *Site Index* form.
- Measure slope distance parallel to the line sighted for the bottom clinometer reading. Record this value in cell 15. Slope Dist.
- Use the lined area on the right hand side of the form to note the horizontal distance used in calculating tree heights. Horizontal distance can be calculated by multiplying the measured slope distance by the slope distance factor corresponding to the bottom clinometer reading (NIVMA Field Guide page G-4).
- The height of leaning trees must be measured perpendicular to the plane of lean.
- Tree heights taken on slopes should be measured out along the contour.

Notes on tree cores³:

- Ensure the core is taken perpendicular to the stem.
- Avoid boring directly into knots. Note, however, that all branches point directly to the pith: overhead branches can be used as a guide to find the pith, which may not be at the geometric centre of the tree.
- Avoid taking cores of compression wood. If leaning trees must be cored, bore at a right angle to the plane of lean. On sites exposed to prevailing winds from one direction stems may be nearly upright, but elliptical in cross section; cores should be taken at a right angle to the long axis of the ellipse.
- Remove bark from the end of the core and mark the grain direction on the cambium.
- Label the cores directly with pencil. Write the Obligation number and tree number near the bark end.
- For broken cores use fractional numbers in proper sequence i.e: 1/3, 2/3, 3/3 for a core with three pieces.
- Cores should be stored in appropriate diameter plastic drinking straws with the ends stapled, not folded or taped. Place the cores in a rigid container to prevent breakage during transport.

³ Excerpted from: Jozsa, L. 1988. Increment core sampling techniques for high quality cores. Forintek Canada Corp. Special Publication No. SP-30.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.
5. **Harvest:** If measurements taken pre-harvest, enter 'PRE' left justified; if measurements taken post-harvest, enter 'POST'.
6. **Layer:** Enter layer, either 'A1' for dominants or 'A2' for codominants (main canopy).
7. **Tree Number:** Enter the number for the tree that is being measured. See Stand Description Table, cell 8 for format. If Site Index trees are outside of the cruise plot radius used on the Stand Description form, number them consecutively starting from 901.

8. Counted Tree Age	Field Guide Pg.: n/a	Form: Site Index
Code Definition	Acceptable Codes	
Take the age at breast height: 1.3 m. The core should deviate no more than one centimetre from the pith.	Must be a whole number from 5 to 450 in BC 5 to 300 in AB	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 year	Example entry: 121 years	1 2 1

9. Radial Growth in The Last 10 Years (cm)	Field Guide Pg.: n/a	Form: Site Index
Code Definition	Acceptable Codes	
Record this measurement in the field in order to avoid problems due to shrinkage of the core during the period between collection and age counting.	Must be a decimal number between 0.2 and 20.0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 mm	Example Entry: 1.7 cm is length of last 10 years growth	1 7

10. **Radial Growth in The Last 20 Years (cm):** As for Radial growth in the last 10 years. See above for format. Must be a decimal number between 0.2 and 40.0; cannot be less than value entered in cell 8.

11. Total length of the core plus rot (cm)	Field Guide Pg.: n/a	Form: Site Index
Code Definition	Acceptable Codes	
Measure rot length and total core length that has a counted age.	Must be a decimal number between 0.2 and 99.9 cm	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 mm	Example Entry: 15.5 cm core plus rot length	1 5 5

12. **Rot Length:** Measure the length of rot in the total core length. See above for format.

13. Top %	Field Guide Pg.: n/a	Form: Site Index
Code Definition	Acceptable Codes	
Must not exceed 100 % for accurate measurement.	Must be a whole number between 10 and 100	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example Entry: 82 %	8 2

14. Bottom %	Field Guide Pg.: n/a	Form: Site Index
Code Definition	Acceptable Codes	
Slope percent to the base of the tree (point of germination), or at a point above the base at a known height if bottom not visible.	Must be a whole number between -60 and +25	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example Entry: - 13 %	- 1 3

15. Slope Distance (m)	Field Guide Pg.: n/a	Form: Site Index
Code Definition	Acceptable Codes	
Measure the slope distance to the base of the tree, or height at which bottom % was shot.	Must be a decimal number between 5.0 and 50.0	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example Entry: 12.1 m	1 2 1

16. Height Correction (m)	Field Guide Pg.: n/a	Form: Site Index
Code Definition	Acceptable Codes	
Enter the height from the base of the tree to the point at which the bottom % was shot (often breast ht. (1.3 m) is convenient).	Must be a decimal number between 0.0 and 3.5	
Field type: Numeric	Justification: Right	
Sampling Standard: $\pm$ 1.0 m	Example Entry: 1.3 m	1 3

17. Measured Height (m)	Field Guide Pg.: n/a	Form: Site Index
Code Definition	Acceptable Codes	
Calculate the height using the data collected in the field.	Must be a decimal number between 1.3 and 55.0 in BC 1.3 and 50.0 in AB	
Field type: Numeric	Justification: Right	
Sampling Standard: 5%	Example Entry:	1 9 6

18. Subplot radius (m): Enter subplot used for each species; either 11.28 m, 13.80 m, or 16.93 m (if the entire installation is used).

19. Species: Enter the tree species code. See Stand Description, cell 9.

Height Correction

HEIGHT CORRECTION TREES

- This information is used to calibrate the estimated heights from the *Stand Description* form.
- **In all stands**, ensure that two trees in each layer are accurately measured (i.e. veterans, A0; dominants and codominants, A1; main canopy, A2; poles, A3) and record pertinent details on the *Height Correction Trees* form. All layers reported on the *Stand Description* form must also be reported on the *Height Correction Trees* form. **Only trees with estimated heights (i.e. those inside the stand description cruise plot radius) may be recorded on the *Height Correction Trees* form.**
- It is not necessary to collect additional heights in dominants and codominants if they have already been obtained on the *Site Index* or *Multi-story Heights* form.

Notes on height measurement:

- Refer to Figure 1. in the *Site Index* section.
- **Do not exceed 100% in the top clinometer reading.**
- **Measure slope distance parallel to the line sighted for the bottom clinometer reading.** Record this value in cell 10. Slope Dist.
- Use the lined area on the right hand side of the form to note the horizontal distance used in calculating tree heights. Horizontal distance can be calculated by multiplying the measured slope distance by the slope distance factor corresponding to the bottom clinometer reading (NIVMA Field Guide page G-4).
- The height of leaning trees must be measured perpendicular to the plane of lean.
- Tree heights taken on slopes should be measured out along the contour.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.
5. **Harvest:** If measurements taken pre-harvest, enter 'PRE' left justified; if measurements taken post-harvest, enter 'POST'.
6. **Tree Number:** Enter the number for the tree that is being measured. See Stand Description Table, cell 8 for format.
7. **Layer:** Enter layer, either 'A0', 'A1', 'A2', or 'A3'.
8. **Top %:** See Site Index Table, cell 13.
9. **Bottom %:** See Site Index Table, cell 14.
10. **Slope Distance (m):** See Site Index Table, cell 15.
11. **Height Correction (m):** See Site Index Table, cell 16.
12. **Measured Height (m):** See Site Index Table, cell 17.

Root Disease

Information

June 6, 1997.

ROOT DISEASE INFORMATION

- This information is collected to provide additional detail on Tomentosus and Armillaria infected trees.
- Complete the *Root Disease Information* form for those trees which showed confirmatory signs (e.g., pitting and or staining for Tomentosus and mycelial fans for Armillaria). Record the tree condition, signs, azimuth and distance from installation centre, and species.

Pre-harvest:

- If stand or tree level symptoms that suggest Tomentosus or Armillaria root diseases are present, check suspected infected trees for diagnostic signs (see table below for specific signs and symptoms of Tomentosus and Armillaria root diseases). Note that suspected infected trees need not be within Stand Description Cruise Plot or even in the installation. **Check for suspect standing trees or blowdown within a 10 m buffer of the installation boundary.**
- For Tomentosus check for signs of disease by chopping into the roots of suspect trees (showing severe crown symptoms) about 30-60 cm from the stem.
- For trees suspected of having Armillaria (heavy basal resinosis), chop into the area of basal resinosis.
- If infected trees outside of the installation are clumped in groups (more than 3 trees), record only the azimuth and distance from installation centre (cell 8) to the centre of the clump, the modal tree condition, and most frequently observed sign.
- All trees reported on the *Stand Description* form to have Tomentosus (DRT) or Armillaria (DRA) root disease must be recorded on this form. If diagnostic signs have not been found, suspect trees can only be described as "DR" on the *Stand Description* form.

Post-harvest:

- **For pre-harvest installations where confirmatory signs of Tomentosus were found within the installation or within a 10m buffer, check for pitting on all stumps within a 5m radius of the infected trees.** This may require chopping into the stump if it has been damaged during harvest.
- If pitting is present in the stump, chop into the roots to confirm Tomentosus by the presence of pitting in the roots and record stump diameter (cell 10) and diameter of pitting (cell 11).
- Paint a ring around and a red cross on top of diseased stumps and mark their locations on the *Installation Diagram*.

Signs and symptoms of Tomentosus and Armillaria Root Diseases ¹ .		
TOMENTOSUS ROOT DISEASE:		
Evidence	Stand level	Tree level
Symptoms	<ul style="list-style-type: none"> -mixture of broadleaved species in conifer stands with possible species shift to subalpine fir. -distinct, small to large openings in stand canopy often producing forest cover changes. -patches of randomly oriented windthrown stems. -poor tree growth and lack of stand vigour. -bark beetle attack. 	<ul style="list-style-type: none"> -crown symptoms include chlorotic and thinning foliage, reduced leader growth, and distress cone crop, but do not include red foliage stage at death (except in association with spruce beetle attack). -windthrown spruce trees lack fine root mass (sharp contrast with large plate like root system of healthy spruce blowdown). -internal symptoms include pink to red-brown coloured stain of the heartwood.
Signs	N/A	<ul style="list-style-type: none"> -canoe-shaped white pitting of the heartwood which extends to bark with age. -honeycomb pattern of decay pits when viewing root or stem in cross section. -pitting follows annual rings but wood does not separate into laminar sheets. -leathery mushroom-like fruiting bodies with tan upper surface and cream coloured porous under surface produced periodically in summer and fall near decayed roots.
ARMILLARIA ROOT DISEASE		
Symptoms	<ul style="list-style-type: none"> -mixture of broadleaved species in conifer stands. -openings in stand canopy filled with dead and dying conifers and shrub species. -snags and broken stems common. -disease centres are often diffusely spread across the landscape, often causing changes in forest cover. -poor tree growth and lack of stand vigour. -bark beetle attack. 	<ul style="list-style-type: none"> -crown symptoms include chlorotic and thinning foliage, reduced leader growth, and distress cone crop, followed by red foliage stage at death. -basal resinosis (minor to copious flow at the base of the stem). -advanced decay is stringy and yellowish with black zone lines, but generally indistinct and non-diagnostic. -bent top.
Signs	N/A	<ul style="list-style-type: none"> -cream to white-coloured, fan-shaped mycelial felts between wood and bark (on cambium), and with bark of roots and root collar just below resinous bark. -on dead tree; mycelial fan etchings on the inner bark usually associated with resin. -honey-coloured mushrooms with ringed stem (annulus) in clumps at tree base during wet, warm summer or fall (late August to early October). -black shoestring-like rhizomorphs in or around bark of roots generally with 60° branching (can be confused with <i>A. sinapina</i>, a saprophyte which has 90° branching).

¹ Adapted from: Forest Practices Code of B.C. Root Disease Management Guidebook, July 1995. B.C. Ministry of Forests.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.
5. **Harvest:** If measurements taken pre-harvest, enter 'PRE' left justified; if measurements taken post-harvest, enter 'POST'.

6. Tree Condition		Field Guide Pg: n/a	Form: Additional Trees
Check for Tomentosus and Armillaria symptoms within the installation and also in a 10 m buffer from the installation boundary.			
Code Definition		Acceptable Codes	
Record the tree's condition: -blowdown -standing dead -standing live		B D L	
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: Blowdown tree	B

7. Signs		Field Guide Pg: n/a	Form: Additional Trees
Check for pitting and stain in Tomentosus suspected trees; if both found, record pitting. Check for mycelial fans in Armillaria suspected trees.			
Code Definition		Acceptable Codes	
Pitting and Stain Stain only Mycelial fans		P S M	
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: mycelial fans observed	M

8. Proximity from installation centre		Field Guide Pg: n/a	Form: Additional Trees
Record the azimuth and distance of the infected tree from the installation centre.			
Code Definition		Acceptable Codes	
Azimuth Distance (m)		Must be a whole number between 1 and 360 Must be a decimal number between 0.1 and 50.0	
Field type: Numeric		Justification: Right	
Sampling Standard: n/a	Example entry: an infected tree was found 10.2 m from the installation centre at an azimuth of 57°.		5 7 1 0 2

9. **Species:** Enter the tree species code. See Stand Description Table, cell 9 for format and allowable codes.

10. Stump Diameter (cm)	Field Guide Pg: n/a	Form: Additional Trees
Code Definition	Acceptable Codes	
For post-harvest only, measure the diameter of stumps where Tomentosus root pitting has been observed.	Must be a decimal number between 7.5 and 999.00 in B.C. 7.5 and 500.00 in Alberta	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: stump diameter = 55.7 cm	5 5 7

11. Diameter of Pitting: Measure the diameter of pitting on stumps suspected of infection with Tomentosus root rot. See above for format.

12. Proximity from installation centre: See cell 13 above for format.

13. Species: Enter the tree species code. See Stand Description Table, cell 9 for format and allowable codes.

Multi-Story Heights and Ages

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

5. Harvest

4. Contractor

For multi-story stands only. SEE SITE INDEX TABLE FOR DETAIL

[illegible]

(Collect 1 age and height for each species and layer in multi-story stands.)

MULTI-STORY HEIGHTS AND AGES

Pre-harvest:

- **Complete the *Multi-story Heights and Ages* form only if the stand's vertical structure is moderate or complex.** Refer to the *Site Index* section to classify the vertical structure of the stand.
- **If the stand is multi-storied (moderate or complex vertical structure), ensure that one height and age are collected for each species in each layer (A0, A1, A2, A3).** Measure and age trees representative of the species and layer (i.e: modal height, diameter, and condition). Measure only those trees that are within the stand description cruise plot.

Post-harvest:

- **Complete the *Multi-story Heights and Ages* form only if the Silviculture Prescription specifies uneven-aged management.**
- **If the Silviculture Prescription specifies uneven-aged management, ensure that one height and age are collected for each species in each layer.**

Notes on height measurement:

- Refer to Figure 1 in the *Site Index* section.
- **Do not exceed 100% in the top clinometer reading.**
- **Measure slope distance parallel to the line sighted for the bottom clinometer reading.** Record this value in cell 15, Slope Dist.
- Use the lined area on the right hand side of the form to note the horizontal distance used in calculating tree heights. Horizontal distance can be calculated by multiplying the measured slope distance by the slope distance factor corresponding to the bottom clinometer reading (NIVMA Field Guide page G-4).
- The height of leaning trees must be measured perpendicular to the plane of lean.
- Tree heights taken on slopes should be measured out along the contour.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.
5. **Harvest:** If measurements taken pre-harvest, enter 'PRE' left justified; if measurements taken post-harvest, enter 'POST'.
6. **Tree Number:** Enter the number for the tree that is being measured. See Stand Description Table, cell 8 for format. If the trees measured are outside of the cruise plot radius used on the Stand Description form, number them consecutively starting from 901.
7. **Layer:** Enter layer, either 'A0', 'A1', 'A2', or 'A3'.
8. **Counted Tree Age:** See Site Index Table, cell 8.
9. **Radial Growth in The Last 10 Years (cm):** See Site Index Table, cell 9.
10. **Radial Growth in The Last 20 Year (cm):** As for Radial growth in the last 10 years. See Site Index Table, cell 10.
11. **Total length of the core plus rot (cm):** See Site Index Table, cell 11.
12. **Rot Length (cm):** Measure the length of rot in the total core length. See above for format.
13. **Top %:** See Site Index Table, cell 13.
14. **Bottom %:** See Site Index Table, cell 14.
15. **Slope Distance (m):** See Site Index Table, cell 15.
16. **Height Correction (m):** See Site Index Table, cell 16.
17. **Height (m):** See Site Index Table, cell 17.
18. **Species:** See Stand Description Table, cell 9.

Quadrant Description

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark	C.P.	Block	Installation	2. Measurement Date
<div style="border: 1px solid black; width: 100%; height: 15px;"></div>	<div style="border: 1px solid black; width: 100%; height: 15px;"></div>	<div style="border: 1px solid black; width: 100%; height: 15px;"></div>	<div style="border: 1px solid black; width: 100%; height: 15px;"></div>	<div style="border: 1px solid black; width: 100%; height: 15px; display: flex; justify-content: space-between;"> y m d </div>

3. Initials of Recorders

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4. Contractor

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5. Photos			Meso Slope						
Q	P	L	6. Pos.	7. Aspect	8. Min. %	Max. %	Avg. %		
1									
2									
3									
4									

11. Denslometer Readings (Optional)

Reading Point	Number of Dots Covered by Canopy							
N								
NE								
E								
SE								
S								
SW								
W								
NW								
Centre								

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation 2. Measurement Date

KL0954 954 1113 y1997 08 d13

3. Initials of Recorders

BPTIAD

4. Contractor

DENDRO

5. Photos			Meso Slope			
Q	P	L	6. Pos.	7. Aspect	8. Min. %	Avg. %
1	✓	✓	g	FLT	0	0
2	✓	✓	d	181	6	12
3	✓	✓	e	VAR	3	6
4	✓	✓	c	195	8	15

11. Densiometer Readings (Optional)

Reading Point	Number of Dots Covered by Canopy							
N								
NE								
E								
SE								
S								
SW								
W								
NW								
Centre								

QUADRANT DESCRIPTION for TRENDS©

QUADRANT DESCRIPTION

This information is collected **pre-harvest only**.

Photos are taken from plot centre towards subplot centre. Take two photos for each quadrant, one landscape and one portrait. Check off on form. **Photos are kept on file by the member and should not be sent in to the Association.**

Densiometer readings are optional at this time, and are only really necessary in areas where a partial harvesting system is planned.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.

5. Photographs	Field Guide Pg.: n/a	Form: Quadrant Description
Code Definition	Acceptable Codes	
Check box	✓	
Field Type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: photo taken in quadrant	✓

6. Meso Slope Position	Field Guide Pg.: A-1	Form: Quadrant Description
Code Definition	Acceptable Codes	
Record the meso slope position for the quadrant.	a, b, c, d, e, f, g	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: middle slope	c

7. Aspect	Field Guide Pg.: n/a	Form: Quadrant Description
Code Definition	Acceptable Codes	
Aspect in degrees.	0 to 360°	
Variable aspects.	VAR	
Flat.	FLT	
Field type: Numeric/Character	Justification: Right	
Sampling Standard: ±10 degrees	Example entry: 45	4 5

8. Slope Percent	Field Guide Pg.: n/a	Form: Quadrant Description
Code Definition	Acceptable Codes	
Record the minimum, maximum and average slopes in percent. For average slope, be sure to enter the dominant slope, rather than the numerical average of the maximum and minimum.	0 to 150	
Field type: Numeric	Justification: Right	
Sampling Standard: ±5%	Example entry: Min. 10, Max 25, Avg. 15.	
	1 0	2 5 1 5

Vegetation Description

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Card No.

OF

3. Measurement Date

y

m

d

4. Initials of Recorders

5. Contractor

VEGETATION

6.

Layer

7. Species

QUADRANT NO.: 1

8. Percent Cover*

9. 10. Modal Ht. (cm)

QUADRANT NO.: 2

Percent Cover*

Modal Ht. (cm)

QUADRANT NO.: 3

Percent Cover*

Modal Ht. (cm)

QUADRANT NO.: 4

Percent Cover*

Modal Ht. (cm)

*If < 5%, enter "1"

REMINDER! Don't forget to do percent cover by layer

Notes:

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Card No.

11 of 11

3. Measurement Date

4. Initials of Recorders

5. Contractor

03A0121127419970805DFEG1HS1LV1C4L

6. Layer	7. Species
B1	
↓	ALNUVIR
↓	SAMBRAC
B2	
↓	RUBUIDA
↓	RUBUPAR
↓	RIBELAC
↓	LONINNV
C	
↓	SPIRBET
↓	CORNCAN
↓	EPILANG
↓	HIERUMB
↓	EQUISSET
↓	THALLOCC
↓	CAREX
D	
↓	PLEUSCH
↓	RHYTTTRI
↓	PELTICAN

QUADRANT NO.: 1	
8. Percent Cover*	9. 10. Modal Ht. (cm)
12	135
12	135
105	60
15	60
55	55
12	40
15	80
508	50
12	70
55	10
257	85
104	40
15	30
85	70
368	2
208	2
153	8
12	2

QUADRANT NO.: 2	
Percent Cover*	Modal Ht. (cm)
12	150
13	145
12	175
5	60
15	60
15	55
12	40
15	110
218	50
12	10
74	100
107	40
15	50
25	70
308	2
208	2
103	10

QUADRANT NO.: 3	
Percent Cover*	Modal Ht. (cm)
13	170
13	170
155	60
15	60
105	60
12	40
15	110
255	50
12	10
107	100
107	40
15	50
13	70
238	2
158	2
83	10

QUADRANT NO.: 4	
Percent Cover*	Modal Ht. (cm)
15	150
15	150
75	60
15	60
55	60
12	40
305	50
15	70
12	10
207	100
12	30
54	40
15	50
408	2
308	2
103	10

*If < 5%, enter "1"

REMEMBER! Don't forget to do percent cover by layer

Notes:

VEGETATION DESCRIPTION for TRENDS©

VEGETATION DESCRIPTION

The information collected on the vegetation description form serves two purposes. First, it is used at pre-harvest to assist in the determination of the correct eco-classification within the installation. Second, as the data is collected over several years in relation to our forestry activities, it will be summarized to describe changes in the plant community. These data will be used to meet monitoring objective #7 both in terms of species richness and habitat evaluation at the installation level, and biodiversity on a landscape level, to document changes on areas under management.

- Record the percent cover and modal height for each vegetation layer B1, B2, C, and D (see NIVMA Field Reference Guide, pg. D-1).
- Record the percent cover, distribution, and modal height for each species within each layer.
- Plant names are recorded as the first four letters of the genus and first three letters of the species with some exceptions. **See list provided for exceptions.**
- Plants should be identified to the species to be useful information in future analyses. Samples of unidentifiable species should be collected for later naming and recorded on the form. Genus only can be recorded if necessary (and GRASS is not accepted).
- If percent cover is estimated at less than 5%, record it as a 1.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Record card number.** (e.g. 1 out of 4 Vegetation Description Forms)
3. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
4. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
5. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.

6. Vegetation Layer	Field Guide Pg.: D-2	Form: Vegetation	
Code Definition	Acceptable Codes		
Tall Shrubs: > 1.3m in height	B1		
Low Shrubs: ≤ 1.3m in height	B2		
Herbs	C		
Mosses, Lichens, Liverworts	D		
Field type: Character	Justification: Left		
Sampling Standard: n/a	Example Entry: Low shrub	B	2

7. Vegetation Species	Field Guide Pg.: H-1 to H-34	Form: Vegetation	
Code Definition	Acceptable Codes		
The species codes generally consist of the first 4 letters of the genus and the first 3 letters of the species. See list of exceptions. Where the genus is known, but the species is not, fill the seven cells with as much of the genus as possible. Unknown species should have a sample collected for later identification.	Use all UPPERCASE (block) letters for plant names for clarity.		
Field type: Character	Justification: Left.		
Sampling Standard: n/a.	Example Entry: <i>Oryzopsis pungens</i>	O	R Y Z P U N

8. Percent Cover	Field Guide Pg.: D-4	Form: Vegetation	
Code Definition	Acceptable Codes		
Record the percent cover for <u>each layer</u> and for <u>each individual species</u> within the layer. If the cover is less than 5%, enter 1	Must be a whole number >0 and ≤100		
Field type: Numeric	Justification: Right		
Sampling Standard: ± 1 %	Example Entry: 20% cover	2	0

9. Distribution Codes	Field Guide Pg.: D-3	Form: Vegetation
*Modified from Luttermerding et al. (1990) to correspond with a 15 m x 15 m quadrant		
Code Definition*	Acceptable Codes	
Rare individual, a single occurrence.	1	
Up to 3 sporadically occurring individuals.	2	
A single patch or clump of species.	3	
4 or more sporadically occurring individuals.	4	
2 or 3 patches or clumps of a species.	5	
4 or more well-spaced patches or clumps.	6	
Continuous, uniform occurrence of well-spaced individuals.	7	
Continuous occurrence of species with a few gaps in the distribution.	8	
Continuous dense occurrence of a species.	9	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a.	Example Entry: continuous uniform cover	7

10. Modal Species Height (cm)	Field Guide Pg.: n/a	Form: Vegetation
Code Definition	Acceptable Codes	
Estimate of modal (most common) height for each species	Must be a number between 1 and 1500	
Field type: Numeric	Justification: Right	
Sampling Standard: shrubs $\pm$ 10 cm, herbs and mosses $\pm$ 1cm	Example Entry: 19 cm	19

Soil Description

Soil Description

Add Cell 12a. Number

To the left of cell 12. where you record the horizon, please add a single box and number the horizons consecutively starting from 1.

Cell 12.	Soil Horizon	
	To record Roman numerals prefixed to master horizon:	
	<u>add</u>	<u>code</u>
	IB	1B
	IIB	2B
	IC	1C
	IIC	2C
	To record transitional horizons:	
	<u>add</u>	BA

Cell 13.	Horizon Modifier	
	ORGANIC SOIL HORIZONS	
	<u>add</u>	
	charcoal seam = buried organic	O horizon with 'b' as modifier

Cell 19.	% Gravel, % Cobbles	
	<u>change</u>	
	range = 0 - 100 (same as table for % Stones)	

Cell 22.	Effective rooting depth	
	<u>change</u>	
	range = 1 - 99	

Cell 28.	Site Sensitivity Hazard Rating	
	<u>change</u>	
	range = 0-99	

BC Ecoclassification

Please write somewhere on your forms the reference for the field guide used to do the ecoclassification. We will have to catch up later on getting this info for older plots. If you can let us know which guides you have been using specific to obligation numbers, this would be appreciated.

Cell 9.	Site series	
	<u>add</u>	
	to the allowable codes, add	01c

Alberta Ecoclassification

Cell 6.	Ecosite Phase	
	<u>change</u>	
	allowable codes	a-n followed by 1-9

Cell 7.	Soil Type	
	<u>add allowable codes</u> ; for complete descriptions see the Alberta guides	
	SV1 - SV4; SD1 - SD4; SM1 - SM4; SMp; SWm; SWp; SR; SS	

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

A 3 H 0 0 7 7 1 0 3 0 1

2. Measurement Date

y 1 9 9 7 m 0 9 d 0 3

3. Initials of Recorders

X Y Z A B C

4. Contractor

P I C E A

5. Soil Pit No. 6. Photos

1 of 2 ☒

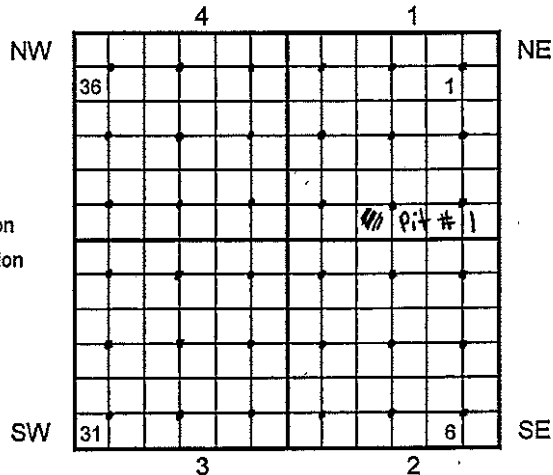
7. Grid point in quadrant # closest to pit

1 0 1

Grid

Quadrant

Soil Pit Location
within Installation
(2.5 m grid)



Humus Description		
8.	9.	10.
Horiz.	Modif.	Ave. Thick
S		1
L	V	1
F	a	5
H	h	4

11. Humus Form

M O R M O D E R

Soil Description

12. Horiz.	13. Modifier			14. Avg. Thick. (cm)	15. Texture	Organic Soils Only		18. Percent Coarse Fragments	19. Composition of Coarse Fragments (Total = Cell 18)			20. Fine Root Abun.
						16. Organic Matter Comp.	17. Von Post		% Gravel	% Cobbles	% Stones	
	1	2	3									
A	h			3	S i L			0	0	0	0	A
B	h	f		15	S i L			5	5	0	0	P
B	t			30	S i C L			11	8	3	0	P
C	g			23	C L			3	1	2	0	F
C	g			14	C			0	0	0	0	X

21. Depth (cm) to Restricting Layers and/or Unfavourable Subsoils

Root Restricting Layers (RR):			Water Restricting Layers (WR):			Unfavourable Subsoil (US):		
1	Dense Parent Mat.	85	1	Dense Parent Mat.	85	1	Dense Parent Mat.	85
2	Dense Clay Bt Horizon		2	Dense Clay Bt Horizon		2	Dense Clay Bt Horizon	
3	Ortstein		3	Ortstein		3	Ortstein	
4	Hardpan		4	Hardpan		4	Hardpan	
5	Bedrock		5	Bedrock		5	Granular	
6	Seepage		6	Water Table		6	Fragmental	
7	Water Table					7	Bedrock	
8	Carbonates					8	Seepage	
						9	Carbonates	

22. Effective Rooting Depth (cm) 48

23. Moisture Regime 5

24. Soil Drainage Class M

25. Mode of Deposition G

26. Flood Hazard R

27. Average Slope 5

28. Site Sensitivity Hazard Ratings

C	S	E	M	F
H	L	5	H	2
3	M	2	2	L
8				

SOIL DESCRIPTION for TRENDS®

SOIL DESCRIPTION

- Dig a soil pit 50 cm by 50 cm and 1 m deep (or to an impenetrable layer) in an area representative of the site series (BC) or eco-phase (AB) for each site series/eco-phase within the installation.
- Complete one *Soil Description* form for each soil pit. Be sure to map the location of the soil pit on the installation map on the Soil Description form.
- Take a flash photograph of each pit face to show the soil horizons. Position a measuring tape vertically against the pit face. Include in the photograph a pit identification card containing the following information:

Obligation no.
Soil Pit no.
Date

Be sure to check the following:

- the humus form actually matches with the humus layers that have been described, according to the humus form key on page C-3 of the NIVMA Field Reference Guide.
- the soil horizons and modifiers make sense according to the textures that are recorded and any applicable restricting layers. For example, if it is noted that dense parent material was encountered at 50 cm, it is unlikely that there would be any horizon depths recorded below this depth. As a general rule, if there is no impenetrable restricting layer, then the soil horizon depths should sum to 100. If an impenetrable restricting layer is encountered, the soil horizon depths should sum to that depth. If seepage or a water table is noticed, check very carefully for mottles.
- the effective rooting depth should not be greater than the depth to a root restricting layer.
- **new for 1997:** the sum of the coarse fragment components recorded in cell 19 must equal that given for the total coarse fragments in cell 18, not 100, as was the case in previous years.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See the Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See the Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See the Administration Table, cell 18 for format.

5. Soil Pit Number	Field Guide Pg.: n/a	Form: Soil Description		
Code Definition	Acceptable Codes			
Dig a soil pit in each ecotype. The soil pits for each installation should be numbered consecutively from 1.	1-9			
Field type: Numeric	Justification: n/a			
Sampling Standard: n/a	Example entry: 1 soil pit for an installation	1	of	1

6. **Photographs:** Check off when photos have been taken.
7. **Grid Point and Quadrant Number:** Map the location of the soil pit on the form. Enter the grid point number closest to the pit and the quadrant that the grid point is in.
8. **Horizon:** This column simply identifies the humus horizons. No entry is required. S=moss, L=litter, F=fibric, H=humic; (see Field Guide C-1).

9. Modifier (Subordinate humus horizons)	Field Guide Pg.: C6-8	Form: Soil Description
Code Definition	Acceptable Codes	
<ul style="list-style-type: none"> - An L (new) horizon composed of newly accreted and essentially unfragmented plant residues. - An L (variative) horizon exhibiting initial decay and strong discoloration. - An F (mycogenous) horizon in which plant residues are aggregated in a matted structure, with a tenacious consistency. - An F (zoogenous) horizon in which plant residues are weakly aggregated with a loose or friable consistency. - An F (amphi) horizon in which plant residues are aggregated into a weak to moderate, noncompact matted structure. - An H (humic) horizon predominated by fine substances with very few if any recognizable plant residues. - An H (zoogenous) horizon predominated by fine substances with very few if any recognizable plant residues; faunal droppings constitute most of the fabric. - An H (residues) horizon predominated by fine substances but that also contains recognizable plant residues, usually fine roots, bark, or wood. <p>The following lowercase suffixes may be applied to any organic horizon (including L, F, H or O).</p> <ul style="list-style-type: none"> - i (intermixed): a horizon containing intermixed mineral particles finer than 2 mm, with 17-35% organic carbon mass. - p (plowed): a horizon that has been substantially altered or disrupted by man's activities, primarily by site management practices including logging and site preparation.. - u: a horizon that has been substantially altered or disrupted by natural processes such as blowdown of trees, animal burrowing, and erosional events. - w (wood): a horizon containing significant amounts (>35% of the volume of solids) of coarse woody debris in various stages of decomposition. 	n	
	v	
	m	
	z	
	a	
	h	
	z	
	r	
	i	
	p	
Field type: Character	Justification: left, 2 single character fields allows for 2 entries.	
Sampling Standard: n/a	Example entry: Ln - an L horizon composed of newly accreted and essentially unfragmented plant residues	n

10. Average S, L, F and H Thicknesses	Field Guide Pg.: n/a	Form: Soil Description
Code Definition	Acceptable Codes	
Enter the thickness of each layer. If <1 cm, enter 1.	1-50	
Field type: Numeric	Justification: Right	
Sampling Standard: $\pm$ 1 cm	Example entry: 12 cm	1 2

11. Humus Form		Field Guide Pg.: C-3	Form: Soil Description
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
	HEMIMOR HUMIMOR RESIMOR LIGNOMOR HYDROMOR FIBRIMOR MESIMOR MORMODER		LEPTOMODER MULLMODER LIGNOMODER HYDROMODER SAPRIMODER VERMIMULL RHIZOMULL HYDROMULL
Field type: Character		Justification: Left	
Sampling Standard: n/a		Example entry: Hydromor	H Y D R O M O R

12. Soil Horizon	Field Guide Pg.: B-28 and B-34	Form: Soil Description
Code Definition	Acceptable Codes	
Enter the acceptable soil horizon code as described in the Field Guide.	A, AB, B, BC, C, O	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: B	B

13. Horizon Modifier	Field Guide Pg.: B 28-37	Form: Soil Description
Code Definition	Acceptable Codes	
MINERAL SOIL HORIZONS:		
Suffix designations may be one or more of the acceptable codes.	b, c, ca, cc, e, f, g, h, j, k, m, n, p, s, sa, t, u, x, y, z	
ORGANIC SOIL HORIZONS:		
Suffix designations may be one or more of the acceptable codes.	f, m, h, i, p, u, w	
Field type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: a cemented, Bt horizon.	
		t c c

14. Average Soil Horizon Thickness	Field Guide Pg.: n/a	Form: Soil Description
Code Definition	Acceptable Codes	
Enter the thickness of each horizon.	1-99	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 cm.	Example entry: 15 cm	1 5

15. Soil Texture		Field Guide Pg.: B20-25	Form: Soil Description
Record the texture of the fine fraction of the soil (those particles $\leq$ 2mm in diameter)			
Code Definition		Acceptable Codes	
Loam Silty Loam Silt Sandy Clay Loam Clay Loam Silty Clay Loam Sandy Clay Silty Clay Clay Heavy Clay Sand Sandy Loam fine Sandy Loam Loamy Sand		L SiL Si SCL CL SiCL SC SiC C HC S SL fSL LS	
Field type: Character		Justification: Left.	
Sampling Standard: n/a		Example entry: sandy clay loam	S C L

16. Organic Material Description		Field Guide Pg.: C-12	Form: Soil Description
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Angiosperm broad leaves	1	Herbaceous fragments	6
Coniferous needles	2	Coprogenous earth	7
Sphagnum moss	3	Woody material all sizes	8
Other mosses, sphagnum Spp.	4	Unrecognizable	9
Sedges, reeds, associated plants	5		
Field type: Character		Justification: n/a	
Sampling Standard: n/a		Example entry: Conifer needles	2

17. Von Post Scale of Decomposition		Field Guide Pg.: C-11	Form: Soil Description
Code Definition	Acceptable Codes	Code Definition	Acceptable Codes
Undecomposed	1	Moderately strongly decomposed	6
Almost undecomposed	2	Strongly decomposed	7
Very weakly decomposed	3	Very strongly decomposed	8
Weakly decomposed	4	Almost completely decomposed	9
Moderately decomposed	5	Completely decomposed	10
Field type: Numeric		Justification: Right	
Sampling Standard: n/a		Example entry: Completely decomposed	1 0

18. Total % Coarse Fragments	Field Guide Pg.: n/a	Form: Soil Description
Code Definition	Acceptable Codes	
Coarse fragments (>2 mm diameter) are described by size class and recorded as an estimated volume. They are estimated visually as a percent of the whole soil volume: % stones + % cobbles + % gravels + % fine fraction = 100% (total soil).	Must be a whole number from 0-100.	
Field type: Numeric	Justification: Right	
Sampling Standard: To the nearest 5%.	Example entry: 25% coarse fragments	2 5

19. % GRAVEL	Field Guide Pg.: n/a	Form: Soil Description
Code Definition	Acceptable Codes	
Enter the % of coarse fragments <7.5 cm so that the % gravel + % cobbles + % stones is equal to the total % for coarse fragments as given in cell 18.	1-100	
Field type: Numeric	Justification: Right	
Sampling Standard: To the nearest 5%.	Example entry: 10% gravel	1 0

19. % COBBLES	Field Guide Pg.: n/a	Form: Soil Description
Code Definition	Acceptable Codes	
Enter the % of coarse fragments that are ≥7.5 cm and <25 cm so that the % gravel + % cobbles + % stones is equal to the total % for coarse fragments as given in cell 18.	1-100	
Field type: Numeric	Justification: Right	
Sampling Standard: To the nearest 5%.	Example entry: 10% cobbles	1 0

19. % STONES	Field Guide Pg.: n/a	Form: Soil Description
Code Definition	Acceptable Codes	
Enter the % of coarse fragments ≥25 cm so that the % gravel + % cobbles + % stones is equal to the total % for coarse fragments as given in cell 18.	0-100	
Field type: Numeric	Justification: Right	
Sampling Standard: To the nearest 5%.	Example entry: 5% stones	5

20. Fine Root Abundance	Field Guide Pg.: B-3	Form: Soil Description
Code Definition	Acceptable Codes	
Number of fine and very fine roots (<2 mm dia.) per square decimeter (or equivalent area in horizons thinner than 10cm). none: 0 few: < 10 plentiful: 10 - 100 abundant: > 100	X F P A	
Field type: Character	Justification: single character field	
Sampling Standard: n/a	Example entry: 15 fine roots	P

21. Depths to Restricting Layers and Unfavourable Subsoils	Field Guide Pg.: n/a	Form: Soil Description
Code Definition	Acceptable Codes	
Record the depth in cm to the applicable layers for root restricting layers, water restricting layers, unfavourable subsoils, bedrock, seepage and carbonates. Leave non-applicable layers blank. <u>Bedrock</u> : bedrock. <u>Carbonates</u> : A soil layer containing appreciable calcium carbonate (lime) in which the soil particles < 2 mm in diameter effervesce (fizz) when contacted with 10% HCl or muriatic acid; these calcareous soils may have white coatings on coarse fragments; may have powdery white deposits in the soil. <u>Dense Clay Bt Horizon</u> : Clay-enriched subsoils of Luvisols >5 cm thick and with clayey textures that cannot be readily dug with a shovel. <u>Dense Parent Materials</u> : Compact glacial till, silt or clay textured glaciolacustrine, or other soil parent materials that cannot be readily dug into with a shovel. <u>Granular</u> : Sandy materials with sand or foamy sand texture - granular materials with a low content of silt and clay, and low water-holding and nutrient-storing capacity. <u>Fragmental</u> : Subsoils comprised of >70% coarse fragments. <u>Hardpan</u> : Compacted roads, landings, etc. <u>Ortstein</u> : A strongly cemented Bh, Bhf or Bf horizon at least 3 cm thick and is reddish brown. They are in areas of high rainfall. <u>Seepage</u> : Consider seepage only for subhygric, hygric and subhydryc sites, as indicated by vegetation (site series). For these sites, estimate typical depth of seepage by direct observation of seepage or water table (make allowances for recent weather and spring break-up); or by inference, using soil colours, either mottling or gleying. <u>Water table</u> : Permanent water table.	1-99	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 cm	Example entry: 22 cm	2 2

22. Effective Rooting Depth	Field Guide Pg.: n/a	Form: Soil Description
Code Definition	Acceptable Codes	
Enter the depth in centimeters from the ground surface down to the bottom of the rooting zone (i.e., the level at which the majority of roots stop, as indicated by the end of "plentiful" rooting abundance).	1-50	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 cm	Example entry: 38 cm	3 8

23. Moisture Regime	Field Guide Pg.: n/a	Form: Soil Description
Code Definition	Acceptable Codes	
Enter the numeric value for the relative moisture regime appropriate for the soil pit. Xeric Subxeric Submesic Mesic Subhygric Hygric Subhydric	1 2 3 4 5 6 7	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1 cm	Example entry: Subhygric	5

24. Soil Drainage Class	Field Guide Pg.: B-13	Form: Soil Description
Code Definition	Acceptable Codes	
Rapidly drained Well-drained Moderately well-drained Imperfectly drained Poorly drained Very poorly drained	R W M I P V	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: Well-drained	W

25. Mode of Deposition	Field Guide Pg.: B-1	Form: Soil Description
Code Definition	Acceptable Codes	
Colluvial Morainal Organic Eolian Lacustrine Weathered bedrock Fluvial Glaciofluvial Bedrock	C M O E L D F G R	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: Lacustrine	L

26. Flood Hazard	Field Guide Pg.: A-9	Form: Soil Description
Code Definition	Acceptable Codes	
Frequent or frequent and irregular (includes old classes A and B). May be expected or occasional (old class C) Rare or no hazard or unlikely (includes old classes D and E).	F M R	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: frequent flooding	F

27. Average Slope	Field Guide Pg.: n/a	Form: Soil Description
Code Definition	Acceptable Codes	
Enter the average slope for the ecotype that the soil pit represents.	0-150	
Field type: Numeric	Justification: Right	
Sampling Standard: $\pm 5\%$.	Example entry: 10% slope	1 0

28. Site Sensitivity Hazard Ratings	Field Guide Pg.: Not E-1 to E-9 See March '96 Hazard Assessment Keys		Form: Soil Description			
Code Definition	Acceptable Codes					
Calculate and record the hazard rating for each category according to the tables in the March '96 version of the Hazard Assessment Keys for Evaluating Site Sensitivity to Soil Degrading Processes Guidebook ¹ where: C = Compaction S = Soil displacement E = Surface soil erosion M = Mass wasting F = Forest floor displacement	Low = L Moderate = M High = H Very High = V followed by a number, 1-99 except for Compaction, which requires a letter code only, and for Mass Wasting, which may or may not require a number.					
Field type: Character	Justification: Character: Left; Numeric: Right					
Sampling Standard: n/a	Example:	C	S	E	M	F
		H	H 2 0	M 1 6	M 3 2	H 2 2

¹ BC Ministry of Forests. 1996. Forest Practices Code of British Columbia Hazard Assessment Keys for Evaluating Site Sensitivity to Soil Degrading Processes Guidebook. Province of British Columbia, Victoria, B.C. pp.28.

Eco-Classification

Soil Description

Add Cell 12a. Number

To the left of cell 12. where you record the horizon, please add a single box and number the horizons consecutively starting from 1.

Cell 12.	Soil Horizon To record Roman numerals prefixed to master horizon: <u>add</u> IB IIB IC IIC To record transitional horizons: <u>add</u>	<u>code</u> 1B 2B 1C 2C BA
----------	--	---

Cell 13.	Horizon Modifier ORGANIC SOIL HORIZONS <u>add</u> charcoal seam = buried organic	O horizon with 'b' as modifier
----------	---	--------------------------------

Cell 19.	% Gravel, % Cobbles <u>change</u> range = 0 - 100 (same as table for % Stones)
----------	--

Cell 22.	Effective rooting depth <u>change</u> range = 1 - 99
----------	--

Cell 28.	Site Sensitivity Hazard Rating <u>change</u> range = 0-99
----------	---

BC Ecoclassification

Please write somewhere on your forms the reference for the field guide used to do the ecoclassification. We will have to catch up later on getting this info for older plots. If you can let us know which guides you have been using specific to obligation numbers, this would be appreciated.

Cell 9.	Site series <u>add</u> to the allowable codes, add	01c
---------	--	-----

Alberta Ecoclassification

Cell 6.	Ecosite Phase <u>change</u> allowable codes	a-n followed by 1-9
---------	---	---------------------

Cell 7.	Soil Type <u>add allowable codes</u> ; for complete descriptions see the Alberta guides SV1 - SV4; SD1 - SD4; SM1 - SM4; SMp; SWm; SWp; SR; SS
---------	--

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

y m d

3. Initials of Recorders

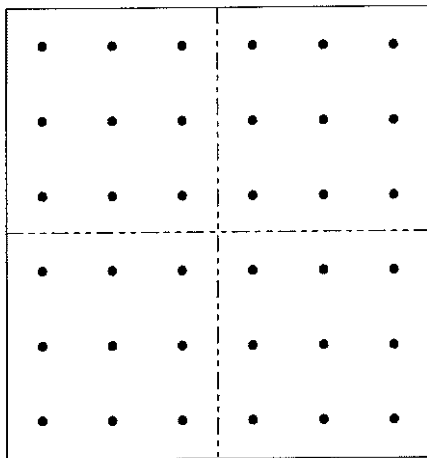
4. Contractor

NW

4

1

NE



SW

3

2

SE

Draw eco-phase boundaries on map and label.

Ref No.	5.*	6.Eco Phase	7. Soil Type
1			
2			
3			
4			
5			
6			
7			
8			

5.* Field Guide, Eco Area/Natural Subregion

8. Eco-class	1	Eco-class	2	Eco-class	3	Eco-class	4	Eco-class	5
8a. Ref. No.		Ref. No.		Ref. No.		Ref. No.		Ref. No.	
9. PCT **		PCT		PCT		PCT		PCT	
10. Edatope (eg.2C)		Edatope		Edatope		Edatope		Edatope	
A B C D E		A B C D E		A B C D E		A B C D E		A B C D E	
1		1		1		1		1	
2		2		2		2		2	
3		3		3		3		3	
4		4		4		4		4	
5		5		5		5		5	
6		6		6		6		6	
7		7		7		7		7	
8		8		8		8		8	
9		9		9		9		9	

9.PCT** = Plant Community Type

Eco-class	6	Eco-class	7	Eco-class	8
Ref. No.		Ref. No.		Ref. No.	
PCT		PCT		PCT	
Edatope (eg.2C)		Edatope		Edatope	
A B C D E		A B C D E		A B C D E	
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	
7		7		7	
8		8		8	
9		9		9	

11. Record by grid plot and quadrant the appropriate soil pit and eco-class no.

G r i d	Q u a d	P i t	Eco-class	G r i d	Q u a d	P i t	Eco-class	G r i d	Q u a d	P i t	Eco-class
1	1			13	1			25	4		
2	1			14	1			26	4		
3	1			15	1			27	4		
4	2			16	2			28	3		
5	2			17	2			29	3		
6	2			18	2			30	3		
7	2			19	3			31	3		
8	2			20	3			32	3		
9	2			21	3			33	3		
10	1			22	4			34	4		
11	1			23	4			35	4		
12	1			24	4			36	4		

Alberta ECO-CLASSIFICATION for TRENDS©

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

A50417

117

21201

19970901

ND PA

4. Contractor

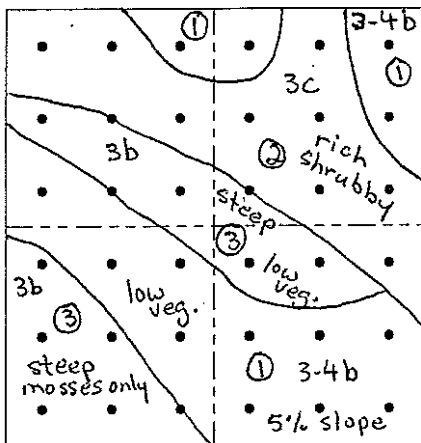
IPB

NW

4

1

NE



Draw site series boundaries on map and label.

Ref No.	5. Zone	6. Subz.	7. Variant
1	CH	mc	1
2			
3			
4			
5			
6			
7			
8			

8. Eco-class	1	Eco-class	2	Eco-class	3	Eco-class	4	Eco-class	5
8a. Ref. No.	1	Ref. No.	1	Ref. No.	1	Ref. No.		Ref. No.	
9. Site Series	01b	Site Series	01b	Site Series	01b	Site Series		Site Series	
10. Edatope (eg. 2C)	4B	Edatope	3C	Edatope	3B	Edatope		Edatope	
A B C D E		A B C D E		A B C D E		A B C D E		A B C D E	
	R		R		R		R		R
	1		1		1		1		1
	2		2		2		2		2
	3	X	3	X	3		3		3
X	4		4		4		4		4
	5		5		5		5		5
	6		6		6		6		6
	7		7		7		7		7
	W		W		W		W		W

Eco-class	6	Eco-class	7	Eco-class	8
Ref. No.		Ref. No.		Ref. No.	
Site Series		Site Series		Site Series	
Edatope		Edatope		Edatope	
A B C D E		A B C D E		A B C D E	
	R		R		R
	1		1		1
	2		2		2
	3		3		3
	4		4		4
	5		5		5
	6		6		6
	7		7		7
	W		W		W

11. Record by grid plot and quadrant the appropriate soil pit and eco-class no.

Grid	Quadrant	Pit	Eco-class	Grid	Quadrant	Pit	Eco-class	Grid	Quadrant	Pit	Eco-class
1	1	1	13	1	1	1	25	4	2	2	2
2	1	1	14	1	2	2	26	4	3	3	3
3	1	2	15	1	3	3	27	4	3	3	3
4	2	2	16	2	3	3	28	3	1	1	1
5	2	1	17	2	1	1	29	3	3	3	3
6	2	1	18	2	1	1	30	3	3	3	3
7	2	1	19	3	3	3	31	3	3	3	3
8	2	1	20	3	1	1	32	3	3	3	3
9	2	3	21	3	1	1	33	3	3	3	3
10	1	2	22	4	3	3	34	4	1	1	1
11	1	2	23	4	2	2	35	4	3	3	3
12	1	2	24	4	1	1	36	4	2	2	2

BC ECO-CLASSIFICATION for TRENDS©

BC ECO-CLASSIFICATION

Using the map provided on the *Eco-classification-BC* form, record any changes in edatope throughout the installation. It is only necessary to record those differences that will remain post-harvest. For example, if a certain situation in the overstorey (e.g. an open-grown tree with a large crown) is creating its own little microsite, only record this change in edatope if you feel that a tree planted in that spot post-harvest will react differently to one planted in the adjacent microsite.

- Record the different zones, subzones and variants that occur on the installation in cells 5, 6 and 7 respectively.
- Complete a different "eco-class" (cells 8a, 9 and 10) for each different edatope on the installation.
 - Record the appropriate Reference No. (cell 8a) that corresponds to the zone, subzone and variant for each eco-class.
 - Record the appropriate Site Series (cell 9) for each eco-class. It is possible that more than one eco-class may have the same site series; for example, an "01" site series may encompass edatopes of "4C" and "4D".
 - Complete the edatopic grid for each eco-class (cell 10). Enter the 2 digit code for the most dominant square that best describes the edatope.
- For each grid point (cell 11), record the pit number for the corresponding soil type within the eco-class and the eco-class number.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.

5. Biogeoclimatic Zone	Field Guide Pg.: n/a	Form: Eco-Classification
Code Definition	Acceptable Codes	
Boreal White and Black Spruce	BWBS	
Coastal Western Hemlock	CWH	
Englemann Spruce - Subalpine Fir	ESSF	
Interior Cedar - Hemlock	ICH	
Interior Douglas-fir	IDF	
Montane Spruce	MS	
Mountain Hemlock	MH	
Spruce Willow Birch	SWB	
Sub-Boreal Spruce	SBS	
Sub-Boreal Pine Spruce	SBPS	
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Interior Cedar - Hemlock	I C H

6. Biogeoclimatic Subzone	Field Guide Pg.: n/a	Form: Eco-Classification
Code Definition	Acceptable Codes	
1st letter - actual precipitation regime code	x,d,m,w, v	
2nd letter - actual temperature regime code	h,w,m,k,c, v	
Field Type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: moist cold	m c

7. Variant	Field Guide Pg.: n/a	Form: Eco-Classification
Objectives: To be used to sort data and record by biogeoclimatic values.		
Code Definition	Acceptable Codes	
As associated with the appropriate subzone, as per the relevant Ecosystem Field Guide.	numbers	
Field Type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: 2	2

8. Eco-class	Field Guide Pg.: n/a	Form: Eco-Classification
Code Definition	Acceptable Codes	
<p>The eco-class represents a specific combination of site series and edatope. A new site series and edatopic grid should be completed for each different situation encountered. For example, starting in quadrant 1 you may find that an edatope of 40% 3C and 60% 4C accurately describes the site. This would be labelled as Eco-class 1. By grid point 4 you may wish to alter that edatope to 50% 4C and 50% 4D or change the site series that best describes the grid plot. This would become Eco-class 2.</p> <p>Record the corresponding Eco-class number later on the form, across from each grid point.</p>	The cells are already numbered	
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example Entry:	2

8a. Biogeoclimatic zone, subzone and variant Ref. no.

9. Site Series	Field Guide Pg.: n/a	Form: Eco-Classification
Code Definition	Acceptable Code	
Enter the code for the one site series that best describes the grid plot.	01 to 11, 01a, 01b	
Field Type: Character	Justification: left	
Sampling Standard: n/a	Example entry: 05	0 5

10. Edatopic Grid	Field Guide Pg.: B-6 to B-9, B-18, B-19	Form: Eco-Classification
Code Definition	Acceptable Codes	
<p>Using the keys in the Biogeoclimatic Classification Guides, fill out the edatopic grid for the grid plot. From these, enter the code for the most dominant square that best describes the grid plot. Note that proportions of rock and water are also accommodated in these grids in conjunction with productive ground.</p>	Edatopic grid = A to E and 1-7, R, W	
Field type: Character/Numeric	Justification: n/a	
Sampling Standard: ± 1 unit	Example Entry: 70% 2C and 30% 3D	2 C

11. Enter the appropriate Soil Pit Number and Eco-class Reference Number that best describes the grid plot.

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

A B C

1 9 9 7

2 0 6

1 9 9 7 0 9 0 8

A B C D E F

4. Contractor

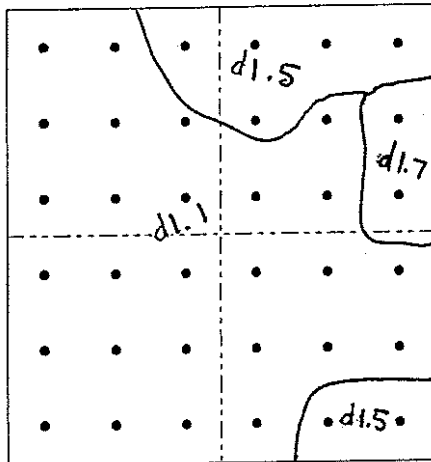
A C E R

NW

4

1

NE



SW

3

2

SE

Draw eco-phase boundaries on map and label.

Ref No.	5.*	6.Eco Phase	7. Soil Type
1	N A M B	d 1	S M 3
2			
3			
4			
5			
6			
7			
8			

5.* Field Guide, Eco Area/Natural Subregion

8. Eco-class	1	Eco-class	2	Eco-class	3	Eco-class	4	Eco-class	5
8a. Ref. No.	1	Ref. No.	1	Ref. No.	1	Ref. No.		Ref. No.	
9. PCT**	d 1.1	PCT	d 1.5	PCT	d 1.7	PCT		PCT	
10. Edatope (eg.2C)	5 C	Edatope	5 C	Edatope	5 C	Edatope		Edatope	
A B C D E		A B C D E		A B C D E		A B C D E		A B C D E	
1		1		1		1		1	
2		2		2		2		2	
3		3		3		3		3	
4		4		4		4		4	
5	X	5	X	5	X	5		5	
6		6		6		6		6	
7		7		7		7		7	
8		8		8		8		8	
9		9		9		9		9	

9. PCT** = Plant Community Type

Eco-class	6	Eco-class	7	Eco-class	8
Ref. No.		Ref. No.		Ref. No.	
PCT		PCT		PCT	
Edatope (eg.2C)		Edatope		Edatope	
A B C D E		A B C D E		A B C D E	
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	
7		7		7	
8		8		8	
9		9		9	

11. Record by grid plot and quadrant the appropriate soil pit and eco-class no.

Grid	Quadrant	Eco-class	Grid	Quadrant	Eco-class	Grid	Quadrant	Eco-class
1	1	1	2	13	1	2	25	4
2	1	1	3	14	1	2	26	4
3	1	1	3	15	1	2	27	4
4	2	1	1	16	2	1	28	3
5	2	1	1	17	2	1	29	3
6	2	1	2	18	2	1	30	3
7	2	1	2	19	3	1	31	3
8	2	1	1	20	3	1	32	3
9	2	1	1	21	3	1	33	3
10	1	1	1	22	4	1	34	4
11	1	1	1	23	4	1	35	4
12	1	1	2	24	4	2	36	4

ALBERTA ECO-CLASSIFICATION

Using the map provided on the *Alberta Eco-classification* form, record any changes in edatope throughout the installation. It is only necessary to record those differences that will remain post-harvest. For example, if a certain situation in the overstorey (e.g. an open-grown tree with a large crown) is creating its own little microsite, only record this change in edatope if you feel that a tree planted in that spot post-harvest will react differently to one planted in the adjacent microsite.

- Record the different eco areas/natural subregions, eco phases and soil types that occur on the installation in cells 5, 6 and 7 respectively.
- Complete a different "eco-class" (cells 8a, 9 and 10) for each different edatope on the installation.
 - Record the appropriate Reference No. (cell 8a) that corresponds to the for each eco-class.
 - Record the appropriate Plant Community Type (PCT, cell 9) for each eco-class.
 - Complete the edatopic grid for each eco-class (cell 10). Enter the 2 digit code for the most dominant square that best describes the edatope.
- For each grid point (cell 11), record the pit number for the corresponding soil type within the eco-class and the eco-class number.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.

5. Field Guide, Eco Area or Natural Subregion	Field Guide Pg.: n/a	Form: Eco-Class - Alberta
Enter the two letter Field Guide code, followed by the two letter Eco Area or Natural Subregion code.		
Code Definition	Acceptable Codes	
Field Guides		
Northern Alberta	NA	
West-central Alberta	WC	
Southwestern Alberta	SW	
Eco Area/Natural Subregion		
Boreal Mixedwood	BM	
Boreal Highlands	BH	
Subarctic	SB	
Canadian Shield	CS	
Lower Foothills	LF	
Upper Foothills	UF	
Montane	MN	
Subalpine	SA	
Field Type: Character	Justification: Left	
Sampling Standard: n/a	Example entry: Northern Alberta field guide, Boreal Mixedwood eco area	N A B M

6. Ecosite Phase	Field Guide Pg.: n/a	Form: Eco-Class - Alberta
Code Definition	Acceptable Codes	
Enter the appropriate ecosite phase according to the field guide being referenced.	a-z followed by 1 to 9	
Field Type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: b2	b 2

7. Soil Type	Field Guide Pg.: n/a	Form: Eco-Class - Alberta
Code Definition	Acceptable Codes	
Enter the appropriate soil type including the soil type identifier, soil moisture class and effective texture class.		
Field Type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: SM4	S M 4

8. Eco-class	Field Guide Pg.: n/a	Form: Eco-Class
Code Definition	Acceptable Codes	
<p>The eco-class represents a specific combination of plant community type and edatope. A new plant community type and edatopic grid should be completed for each different situation encountered. For example, starting in quadrant 1 you may find that an edatope of 40% 3C and 60% 4C accurately describes the site. This would be labelled as Eco-class 1. By grid point 4 you may wish to alter that edatope to 50% 4C and 50% 4D or change the plant community type that best describes the grid plot. This would become Edatope Type 2.</p> <p>Record the corresponding Eco-class number later on the form, across from each grid point.</p>	The cells are already numbered	
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example Entry:	2

8.a Field Guide, Eco Area/Natural Subregion, Ecosite Phase, Soil Type Ref. no.: Enter the corresponding reference no. that describes the site.

9. Plant Community Type	Field Guide Pg.: n/a	Form: Eco-Class - Alberta
Code Definition	Acceptable Code	
Enter the code for the plant community type that best describes the grid plot.	a-z followed by 1-9, followed by .1-9	
Field Type: Character/Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: b2.2	b 2 2

10. Edatopic Grid	Field Guide Pg.: B-6 to B9, B-18,B-19	Form: Eco-Class - Alberta
Code Definition	Acceptable Codes	
Using the fields guides to ecosites, fill out the edatopic grid for the grid plot. From these, enter the codes for one (100%) or two (x+y=100%) edatopic grid positions that best describe the grid plot. Note that proportions of rock and water are also accommodated in these grids in conjunction with productive ground.	<p>Percents = 10-100 Edatopic grid = A to E and 1-9, R, W</p>	
Field type: Character/Numeric	Justification: Right	
Sampling Standard: ±1 unit	Example Entry: 70%2C and 30%3D	2 C

11. Enter the Soil Pit Number and Eco-class that best describes the grid plot.

Subplot Densities and Regeneration

Subplot Densities and Regeneration/Plantable Spot Survey

- Cell 13. Damaging Agents
should read:
See the Stand Description table, cells 17 and 18, record the number of stems infected.
- Cell 14. Please note that you now have the choice of four forms for this section. Use one or two of the modified forms depending on whether you are dealing with a single storied stand or a multi-storied stand and are conducting a "stocking/Free Growing survey" or a "Free Growing" survey, or both. New blank forms are attached to this document.
- Cell 15. Free Growing
change
range = 0 - 75

Site Disturbance

- Cell 5. Disturbance Type
add
Compacted Area = A
Corduroy Road = Y
change
115.5 to 115.0 under the Distance column.
See write up under Disturbance Type: change to "if no disturbance exists at that spot, or it cannot be classified, simply..."
- Cell 6. Depth
change
range = 0-50
- Cell 7. See write up under Forest Floor Displacement: add: "In cases where there is no classifiable Disturbance type, but there is Forest Floor Displacement, record a "-" under Disturbance Type and a "1" under Forest Floor Displacement.

Repeatedly Measured Trees

- Cell 26. Tree DBH
change
range = 0.5-50

Competition Description

- Cell 13. Vegetation in 45° Cone
add
"C" below "B2" and corresponding cells for proximity distance.
- Cell 6. Percent Cover
See tables
delete
"Refer to Vegetation table cell 8 for format." This is not correct as you are to record individual percentages, not just "1" for anything under 5 percent.

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

Form ①

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

4. Contractor

5. QUADRANT NO.:

①

LAYER	6. Species	7. Percent Cover	8. D	9. Height Range (cm)		10. Modal Ht. (cm)	11. Plot Radius (m)	12. No. of Stems
				Min.	Max.			
A6: Germinants								
<2yrs. & <10cm								
A5: Seedlings								
> or = 2 yrs. > or = 10cm and < 1.3m								
A4: Saplings								
> or = 1.3m & < 10m & < 7.5cm DBH								

Single Story
*Stocking / Free Growing Survey:
- Complete sections ① and ② and ⑤
- Complete sections ③ or ④ when necessary.

Stocking Standard Reference No. ☐

FOR BC MEMBERS ONLY

"Regeneration" Survey (Post-Harvest Only, Planted or not)

②

Layer	14. Healthy, Well-Spaced Species										15. FG
A5. Seedling											
A4. Sapling											
A3. Poles											
A2. Main Canopy											
A1. Dominant											

Preparable/Plantable Spot Survey

③ (Post-Harvest, Pre-Planting Only).

3.99 m radius plot		
16. Prep. Spots	17. Plant. Spots	18. NP %

ALL MEMBERS:

Dropped Cone Survey (Post-Harvest, Natural Regeneration Pine areas only).

④

1.26 m radius plot			
19. # Cones	20. Soil Type	21. LFH Depth (cm)	22. Slash Rating

* maximize number of well-spaced

SUBPLOT DENSITIES AND REGENERATION/PLANTABLE SPOT SURVEY for TRENDS©

Page 1 of 2

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

Form ②

1. Obligation No.

Timbermark C.P. Block Installation

2. Measurement Date

y m d

3. Initials of Recorders

4. Contractor

5. QUADRANT NO.: ☐

①

LAYER	6. Species	7. Percent Cover	8. D	9. Height Range (cm)		10. Modal Ht. (cm)	11. Plot Radius (m)	12. No. of Stems
				Min.	Max.			
A6: Germinants <2yrs. & <10cm								
A5: Seedlings > or = 2 yrs. > or = 10cm and < 1.3m								
A4: Saplings > or = 1.3m & < 10m & < 7.5cm DBH								

Single Story
*Free Growing
Survey:
Complete Section
② only.

FOR BC MEMBERS ONLY

Stocking Standard Reference No. ☐

②

"Regeneration" Survey (Post-Harvest Only, Planted or not)

Layer	14. Healthy, Well-Spaced Species										15. FG
A5. Seedling											
A4. Sapling											
A3. Poles											
A2. Main Canopy											
A1. Dominant											

Preparable/Plantable Spot Survey

③ (Post-Harvest, Pre-Planting Only).

3.99 m radius plot		
16. Prep. Spots	17. Plant. Spots	18. NP %

ALL MEMBERS:

Dropped Cone Survey (Post-Harvest, Natural Regeneration Pine areas only).

④

1.26 m radius plot			
19. # Cones	20. Soil Type	21. LFH Depth (cm)	22. Slash Rating

②

Countable Stems	Countable Height (cm)
A5	
A4	
A3	
A2	
A1	

*maximize number of free growing

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

Form ③

4. Contractor

5. QUADRANT NO.:

①

LAYER	6. Species	7. Percent Cover	8. D	9. Height Range (cm)		10. Modal Ht. (cm)	11. Plot Radius (m)	12. No. of Stems
				Min.	Max.			
A6: Germinants								
<2yrs. & <10cm								
A5: Seedlings								
> or = 2 yrs. > or = 10cm and < 1.3m								
A4: Saplings								
> or = 1.3m & < 10m & < 7.5cm DBH								

Multi-Story
Stocking / Free
Growing Survey:
- complete sections
① and ② and ⑤
- complete sections
③ and ④ when
necessary.

②

FOR BC MEMBERS ONLY

Stocking Standard Reference No. □

"Regeneration" Survey (Post-Harvest Only, Planted or not)

Preparable/Plantable Spot Survey

③ (Post-Harvest, Pre-Planting Only).

Layer	14. Healthy, Well-Spaced Species										15. FG
L4 44 Seedling											
L3 44 Sapling											
L2 44 Poles											
L1 44 Main Canopy											
L1 44 Dominant											

3.99 m radius plot

16. Prep. Spots	17. Plant. Spots	18. NP %

Basal area m²/ha

ALL MEMBERS:

④

Dropped Cone Survey (Post-Harvest, Natural Regeneration Pine areas only).

1.26 m radius plot			
19. # Cones	20. Soil Type	21. LFH Depth (cm)	22. Slash Rating

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark C.P. Block Installation

2. Measurement Date

y m d

3. Initials of Recorders

Form ④

4. Contractor

5. QUADRANT NO.: ☐

①

LAYER	6. Species	7. Percent Cover	8. D	9. Height Range (cm)		10. Modal Ht. (cm)	11. Plot Radius (m)	12. No. of Stems
				Min.	Max.			
A6: Germinants <2yrs. & <10cm								
A5: Seedlings > or = 2 yrs. > or = 10cm and < 1.3m								
A4: Saplings > or = 1.3m & < 10m & < 7.5cm DBH								

Multi-Story
Free Growing Survey:
- complete section
② only

② FOR BC MEMBERS ONLY

Stocking Standard Reference No. ☐

"Regeneration" Survey (Post-Harvest Only, Planted or not)

Layer	14. Healthy, Well-Spaced Species	15. FG
L4 Seedling		
L3 Sapling		
L2 Poles		
L1 Main Canopy		
Dominant		

③ Preparable/Plantable Spot Survey
(Post-Harvest, Pre-Planting Only).

3.99 m radius plot		
16. Prep. Spots	17. Plant. Spots	18. NP %

Basal area m²/ha

②

Countable Stems	Countable Height (cm)
L3	

ALL MEMBERS:

Dropped Cone Survey (Post-Harvest, Natural Regeneration Pine areas only).

④

1.26 m radius plot			
19. # Cones	20. Soil Type	21. LFH Depth (cm)	22. Slash Rating

SUBPLOT DENSITIES AND REGENERATION/PLANTABLE SPOT SURVEY for TRENDS©

Page 1 of 2

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

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--	--	--	--	--	--	--	--

5. QUADRANT NO.:

4. Contractor

--	--	--	--	--	--	--	--

LAYER	6. Species	7. Percent Cover	8. D	9. Height Range (cm)		10. Modal Ht. (cm)	11. Plot Radius (m)	12. No. of Stems
				Min.	Max.			
A6: Germinants <2yrs. & <10cm								
A5: Seedlings > or = 2 yrs. > or = 10cm and < 1.3m								
A4: Saplings > or = 1.3m & < 10m & < 7.5cm DBH								

FOR BC MEMBERS ONLY

"Regeneration" Survey (Post-Harvest Only, Planted or not)

Layer	14. Healthy, Well-Spaced Species										15. FG
A5. Seedling											
A4. Sapling											
A3. Poles											
A2. Main Canopy											
A1. Dominant											

Preparable/Plantable Spot Survey (Post-Harvest, Pre-Planting Only).

3.99 m radius plot		
16. Prep. Spots	17. Plant. Spots	18. NP %

ALL MEMBERS:

Dropped Cone Survey (Post-Harvest, Natural Regeneration Pine areas only).

1.26 m radius plot			
19. # Cones	20. Soil Type	21. LFH Depth (cm)	22. Slash Rating

SUBPLOT DENSITIES AND REGENERATION/PLANTABLE SPOT SURVEY for TRENDS©

Page 1 of 2

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

0	3	5	0	0	9			9			5	1
---	---	---	---	---	---	--	--	---	--	--	---	---

19970718

P	A	T	T	A	B
---	---	---	---	---	---

5. QUADRANT NO.: 2

4. Contractor

|D|E|N|D|R|O| |

[illegible]

FOR BC MEMBERS ONLY

"Regeneration" Survey (Post-Harvest Only, Planted or not)

[illegible]

* **Preparable/Plantable Spot Survey**
(Post-Harvest, Pre-Planting Only).

3.99 m radius plot					
16.		17.		18. NP %	
Prep.		Plant.			
Spots		Spots			
	2		6		0

ALL MEMBERS:

* Dropped Cone Survey (Post-Harvest, Natural Regeneration Pine areas only).

1.26 m radius plot															
19. # Cones				20. Soil Type				21. LFH Depth (cm)				22. Slash Rating			
		7		M			X					5			L

* These are completed as examples only.
They would not be completed with the rest of the form.

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

035009

9970718

PAT TAB

5. QUADRANT NO.: 2

4. Contractor

DENDRO

LAYER	6. Species	13. Damaging Agents			Damaging Agents			Damaging Agents		
		Agent	Severity	No. Stems	Agent	Severity	No. Stems	Agent	Severity	No. Stems
A6: Germinants <2yrs. & <10cm										
A5: Seedlings > or = 2 yrs. > or = 10cm and < 1.3m	Sx	D	R	C	S					
A4: Saplings > or = 1.3m & < 10m & < 7.5cm DBH	A	t	D	L	V	I	O			

SUBPLOT DENSITIES AND REGENERATION/PLANTABLE SPOT SURVEY

Subplot Densities:

Subplot data will be used to complete a description of an installation in terms of the vegetation when combined with the data collected on the Stand Description and the Vegetation Description forms. The description so derived, will meet objective #7 in terms of long term biodiversity monitoring on managed sites.

The data will also be used to describe how stands grow from a growth and yield perspective when coupled with the data from the Stand Description form when trees on site move from the lower layers to ≥ 7.5 cm dbh. The heights by species and layer will be used to generate a Silviculture Label when combined with the data from the regeneration surveys. The density data may be used by Alberta members in terms of meeting their regeneration targets. Lastly, the damaging agent and severity information will provide a complete forest health picture when combined with similar data from the Repeatedly Measured trees and meet objective #8.

- By layer, record species, percent cover, distribution, minimum/maximum/modal heights, and number of stems.
- Record plot radius used. Usually a 3.99 m radius plot should be used, but if what you are counting is dense, you may use a 1.26 m radius plot. Conversely, if what you are counting is sparse, you may use a 5.64 m radius plot.
- By layer, record all observed damage for each species including the number of stems affected.

"Regeneration" Survey:

This section is completed for BC members only. It is conducted Post-harvest, regardless of whether the installation has been planted or not.

Where the Subplot Density Sweeps (recorded in the upper portion of this form) are simply a count of the total number of trees by layer in a 3.99 m plot, the information collected in the "regeneration" survey section of the form is similar to that collected for operational silviculture surveys. The purpose of this section is to determine the "Silviculture Label" for each quadrant within the installation. This silviculture label can then be compared with the silviculture label determined by the operational silviculture survey on the remainder of the treatment unit, and is a link between the installation and the standards of performance as described in the Silviculture Prescription.

Because of the link with the Silviculture Prescription, the method used for the "regeneration" survey (standards and specifications) on the *TRENDS* installation must be identical to that which would be used by a survey crew when conducting a survey on the remainder of that treatment unit on the cut block. In situations where an installation falls on the boundary of two treatment units, it may be necessary to use different survey methods in each quadrant, depending on the standards applying to the treatment units that they fall into.

Members must confirm with their contractors the survey method or methods that they wish to be used on each installation, particularly where there are special requirements (e.g., multi-story survey, uneven-age management).

Using a 3.99 m circular subplot at the centre of each quadrant, record the following information in cells 14 and 15 on the *Subplot Densities and Regeneration/Plantable Spot Survey* form (See the *Subplot Densities and Regeneration/Plantable Spot Survey* tables which follow for acceptable codes):

- the number of healthy, well-spaced trees, by species and layer according to the agreed-upon survey methodology.
- the number of those recorded trees that meet the Free Growing criteria as specified on the *Administration* form.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.
5. Enter the Quadrant Number.
6. **Species:** Refer to the Stand Description table, cell 9.

7. Percent Cover	Field Guide Pg.: D-4	Form: Subplot
Code Definition	Acceptable Codes	
Record the percent cover for each species by layer.	1-100	
Field type: Numeric	Justification: Right	
Sampling Standard: $\pm 1\%$	Example Entry: 20 % cover	2 0

8. **Distribution Codes:** Refer to the Vegetation table, cell 9.

9. Height Range (cm) Min./Max.	Field Guide Pg.: n/a	Form: Subplot
Code Definition	Acceptable Codes	
Estimate the minimum and maximum heights for each species by layer.	1-999	
Field type: Numeric	Justification: Right.	
Sampling Standard: $\pm 10\%$	Example Entry: 98 cm	0 9 8

10. Modal Height (cm)	Field Guide Pg.: n/a	Form: Subplot
Code Definition	Acceptable Codes	
Record the modal height (i.e. the most frequent height) for each species	1-999	
Field type: Numeric	Justification: Right	
Sampling Standard: trees ± 10 cm (<5 m ht. , ± 0.5 m (≥ 5 m ht.))	Example Entry: 19 cm	1 9

11. Plot radius (m)	Field Guide Pg.: n/a	Form: Subplot
Code Definition	Acceptable Codes	
Record size of plot used.	1.26, 3.99, or 5.64	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example Entry: 3.99 m	3 9 9

17. Plantable Spots	Field Guide Pg.: n/a	Form: Subplot
Code Definition	Acceptable Codes	
Record the number of plantable spots within a 3.99 m radius circle.	0-75	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 1	Example Entry: 4 plantable spots	4

18. Percent non-productive	Field Guide Pg.: n/a	Form: Subplot
Code Definition	Acceptable Codes	
Record the percent non-productive area within the 3.99 m radius subplot	0-100	
Field type: Numeric	Justification: Right	
Sampling Standard: $\pm 10\%$	Example entry: 25% non-productive	2 5

19. Number of Cones	Field Guide Pg.: n/a	Form: Subplot
Code Definition	Acceptable Codes	
Record the number of pine cones present on the surface of a 1.26 m radius plot.	0-300	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 5 cones	Example entry: 25 cones	2 5

20. Soil Type	Field Guide Pg.: n/a	Form: Subplot
Code Definition	Acceptable Codes	
Record the soil type mix in the 1.26 m radius plot: -mineral soil: -organic: -mixture of mineral and organic:	MIN ORG MIX	
Field type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: mixed mineral and organic	M I X

21. LFH depth (cm)	Field Guide Pg.: n/a	Form: Subplot
Code Definition	Acceptable Codes	
Record the LFH depth in the 1.26 m radius plot.	0-60	
Field type: Numeric	Justification: Right	
Sampling Standard: n/a	Example entry: 5 cm	5

Site Disturbance

Subplot Densities and Regeneration/Plantable Spot Survey

- Cell 13. Damaging Agents
should read:
See the Stand Description table, cells 17 and 18, record the number of stems infected.
- Cell 14. Please note that you now have the choice of four forms for this section. Use one or two of the modified forms depending on whether you are dealing with a single storied stand or a multi-storied stand and are conducting a "stocking/Free Growing survey" or a "Free Growing" survey, or both. New blank forms are attached to this document.
- Cell 15. Free Growing
change
range = 0 - 75

Site Disturbance

- Cell 5. Disturbance Type
add
Compacted Area = A
Corduoy Road = Y
change
115.5 to 115.0 under the Distance column.
See write up under **Disturbance Type:** change to "if no disturbance exists at that spot, or it cannot be classified, simply..."
- Cell 6. Depth
change
range = 0-50
- Cell 7. See write up under **Forest Floor Displacement:** add: "In cases where there is no classifiable Disturbance type, but there is Forest Floor Displacement, record a "-" under Disturbance Type and a "1" under Forest Floor Displacement.

Repeatedly Measured Trees

- Cell 26. Tree DBH
change
range = 0.5-50

Competition Description

- Cell 13. Vegetation in 45° Cone
add
"C" below "B2" and corresponding cells for proximity distance.
- Cell 6. Percent Cover
See tables
delete
"Refer to Vegetation table cell 8 for format." This is not correct as you are to record individual percentages, not just "1" for anything under 5 percent.

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark	C.P.	Block	Installation
<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>

2. Measurement Date

y	m	d
<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>

3. Initials of Recorders

4. Contractor

Distance (m)			5. Disturb. Type	6. Depth	7. Forest Fl. Disp.	8. Soil Type
	0	0.0				
	2	.5				
	5	.0				
	7	.5				
1	0	0.0				
1	2	.5				
1	5	.0				
1	7	.5				
2	0	0.0				
2	2	.5				
2	5	.0				
2	7	.5				
3	0	0.0				
3	5	.0				
3	7	.5				
4	0	0.0				
4	2	.5				
4	5	.0				
4	7	.5				
5	0	0.0				
5	2	.5				
5	5	.0				
5	7	.5				
6	0	0.0				
6	2	.5				
6	5	.0				
7	0	0.0				
7	2	.5				
7	5	.0				
7	7	.5				
8	0	0.0				
8	2	.5				
8	5	.0				
8	7	.5				
9	0	0.0				
9	2	.5				
9	5	.0				
9	7	.5				
1	0	0.0				

Distance (m)			5. Disturb. Type	6. Depth	7. Forest Fl. Disp.	8. Soil Type
1	0	5.0				
1	0	7.5				
1	1	0.0				
1	1	2.5				
1	1	5.5				
1	1	7.5				
1	2	0.0				
1	2	2.5				
1	2	5.0				
1	2	7.5				
1	3	0.0				
1	3	2.5				
1	3	5.0				
1	4	0.0				
1	4	2.5				
1	4	5.0				
1	4	7.5				
1	5	0.0				
1	5	2.5				
1	5	5.0				
1	5	7.5				
1	6	0.0				
1	6	2.5				
1	6	5.0				
1	6	7.5				
1	7	0.0				
1	7	5.0				
1	7	7.5				
1	8	0.0				
1	8	2.5				
1	8	5.0				
1	8	7.5				
1	9	0.0				
1	9	2.5				
1	9	5.0				
1	9	7.5				
2	0	0.0				
2	0	2.5				
2	0	5.0				

SITE DISTURBANCE for TRENDS®

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

P20083 83 21 2

119970823

3. Initials of Recorders

4. Contractor

MNOPQR

TREES INC

Distance (m)	5. Disturb. Type	6. Depth	7. Forest Fl. Disp.	8. Soil Type
0.0				
2.5				
5.0				
7.5				
1 0.0				
1 2.5				
1 5.0				
1 7.5				
2 0.0				
2 2.5				
2 5.0				
2 7.5				
3 0.0				
3 5.0				
3 7.5				
4 0.0				
4 2.5				
4 5.0				
4 7.5				
5 0.0				
5 2.5				
5 5.0				
5 7.5				
6 0.0				
6 2.5				
6 5.0				
7 0.0				
7 2.5				
7 5.0				
7 7.5				
8 0.0				
8 2.5				
8 5.0				
8 7.5				
9 0.0				
9 2.5				
9 5.0				
9 7.5	E		3	0 1
1 0 0.0	E		3	0 1

Distance (m)	5. Disturb. Type	6. Depth	7. Forest Fl. Disp.	8. Soil Type
1 0 5.0				
1 0 7.5	E		4	0 1
1 1 0.0	E		5	1 1
1 1 2.5	E		5	1 1
1 1 5.5				
1 1 7.5				
1 2 0.0				
1 2 2.5				
1 2 5.0				
1 2 7.5				
1 3 0.0				
1 3 2.5				
1 3 5.0				
1 4 0.0				
1 4 2.5				
1 4 5.0				
1 4 7.5				
1 5 0.0				
1 5 2.5				
1 5 5.0				
1 5 7.5				
1 6 0.0	E		4	1 2
1 6 2.5	E		4	1 2
1 6 5.0	E		4	0 2
1 6 7.5				
1 7 0.0				
1 7 5.0				
1 7 7.5				
1 8 0.0				
1 8 2.5				
1 8 5.0	E		3	0 2
1 8 7.5	E		3	0 2
1 9 0.0	E		3	0 2
1 9 2.5				
1 9 5.0				
1 9 7.5				
2 0 0.0				
2 0 2.5				
2 0 5.0				

SITE DISTURBANCE for TRENDS®

SITE DISTURBANCE

This information is collected in order to satisfy monitoring objective number 4.

The Site Disturbance data is collected using a point sampling method, every 2.5 m (within the installation), along a 205 m transect that follows a north-south line through the 36 grid points (see figure 1).

Make an assessment of the site disturbance and forest floor displacement at those points represented by the distances given on the *Site Disturbance* form. Record the following information on the form:

- **Disturbance Type:** Classify any disturbance type that the sample point falls into according to the dimensions given on the May 1996 version of the MOF Soil Disturbance Card and Appendix 5 of the January 1997 version of the Soil Conservation Surveys Guidebook¹. Classify all disturbances regardless of soil type. For example, Repeated Machine Traffic, for the purposes of an official site disturbance survey, is only recorded if it occurs on very high, high or moderate compaction hazard sites; however, for *TRENDS* purposes, record all disturbances on all sites. If no disturbance exists at that spot, simply put a slash through the spaces for disturbance type ("-"). If the survey point lands on a permanent access road or landing (i.e. that is not to be rehabilitated), record "X".
- **Depth:** Record the depth (in centimetres) of the disturbance from the top of the mineral soil to the bottom of the disturbance at the sample point, except in the case of ruts. In this case, measure to the deepest point along the cross-section of the rut at the survey point.
- **Forest Floor Displacement:** By their nature, some disturbance types automatically classify as forest floor displacement. These are gouges, scalps and temporary trails. Record a "1" in this column for all of these disturbances. Forest floor displacement may or may not occur in the case of ruts, repeated machine traffic, compaction areas or corduroy trails. In these cases, if the forest floor has been displaced, record "1". If it has not, record "0".
- **Soil Type:** Record the number of the soil pit corresponding to the site series in which the disturbance falls. If there was only one soil pit dug on the installation, enter 1 in this column.

¹ BC Ministry of Forests. 1997. Forest Practices Code of British Columbia Soil Conservation Surveys Guidebook. Province of British Columbia, Victoria, BC. p. 56.

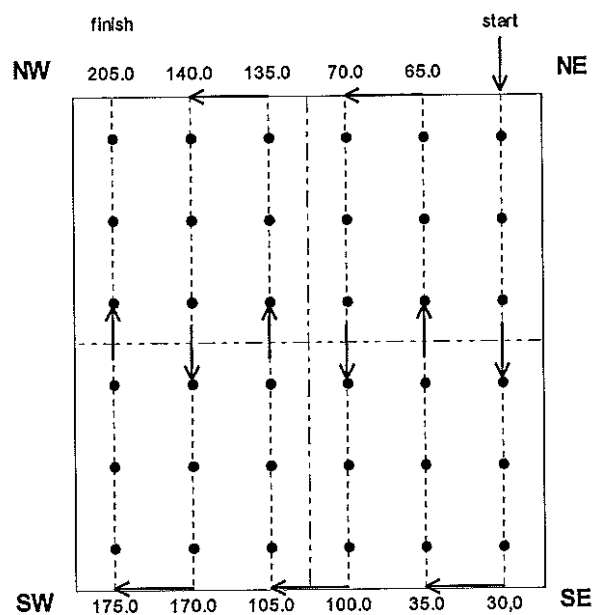


Figure 1: Site Disturbance Transect.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.

2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.

3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.

4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.

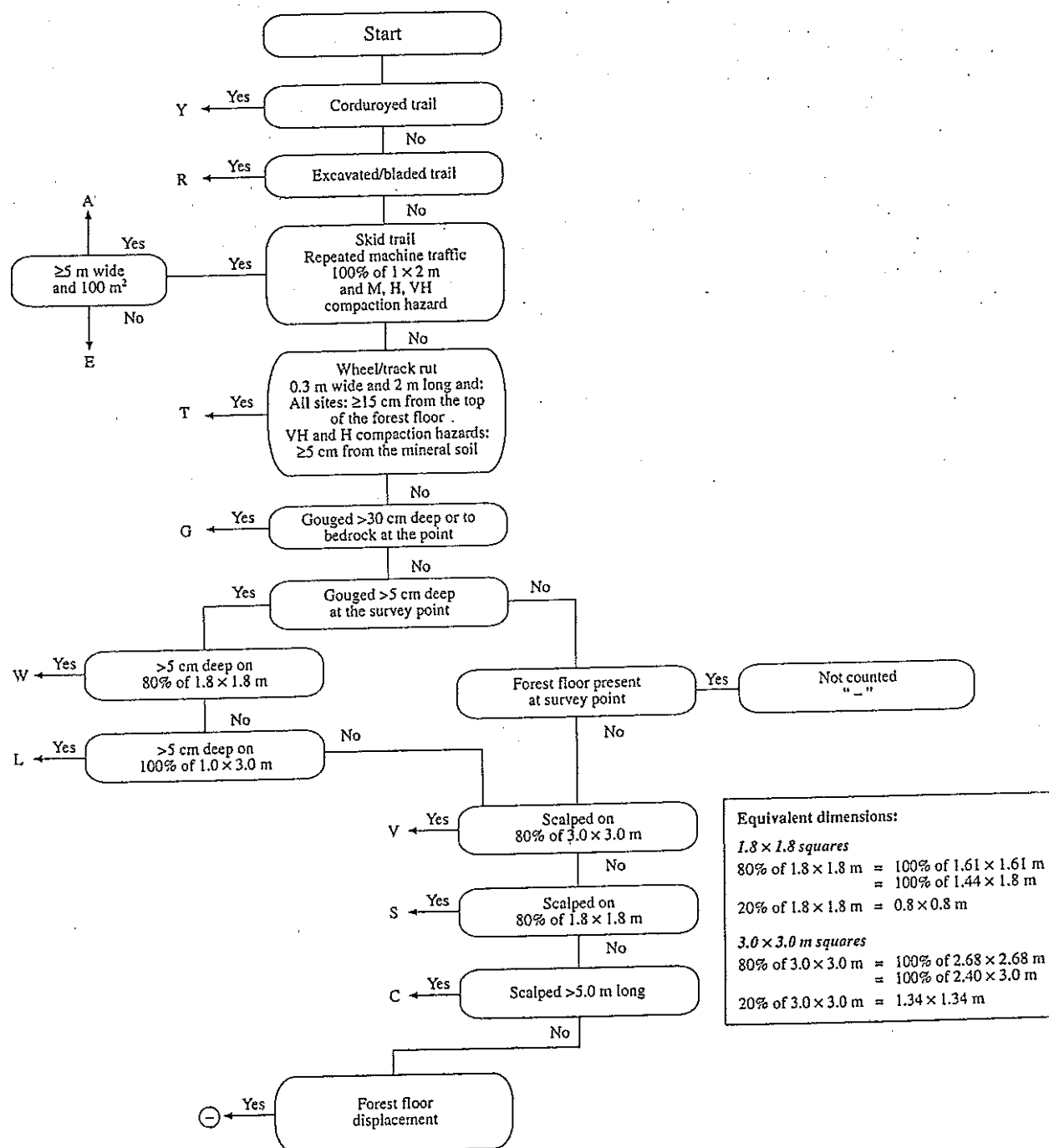
5. Disturbance Type	Field Guide Pg.: n/a	Form: Site Disturbance
* Refer to the May 1996 version of the MOF Soil Disturbance card or Appendix 5 of the Soil Conservation Surveys Guidebook.		
Code Definition	Acceptable Codes	
Wheel/Track Rut	T	
Repeated Machine Traffic	E	
Temporary Excavated/Bladed Trails	R	
Deep Gouge	G	
Long Gouge	L	
Wide Gouge	W	
Very Wide Scalp	V	
Wide Scalp	S	
Continuous Scalp	C	
Undisturbed	-	
Not surveyed (e.g. permanent road or landing)	X	
Field Type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: disturbance 30 cm by 2.5 m long and 7 cm deep	T

6. Depth (cm)	Field Guide Pg.: n/a	Form: Site Disturbance
Code Definition	Acceptable Codes	
Record the depth from the top of the mineral soil to the bottom of the disturbance.	1-50	
Field Type: Numeric	Justification: Right	
Sampling Standard: ± 1 cm	Example entry: 6 cm	6

7. Forest Floor Displacement	Field Guide Pg.: n/a	Form: Site Disturbance
Assess whether or not the forest floor has been displaced at the point of observation.		
Code Definition	Acceptable Codes	
Yes	1	
No	0	
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Yes	1

8. **Soil Type:** Record the soil pit number that best describes the soil within the area of the disturbance.

Appendix 5. Flow chart for correct assessment of soil disturbance survey points under the Code



Note: This flow chart does not address rehabilitated areas. Where planned rehabilitation has been successfully carried out, exposed mineral soil surfaces should be recorded as forest floor displacement and not as soil disturbance (field symbol "⊖" with a circle around it).

Cone Crop Ratings

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

3

m

2

3. Initials of Recorders

[illegible]

4. Contractor

--	--	--	--	--	--

For areas where natural regeneration is intended to be the major regeneration method:

[illegible]

CONE CROP RATINGS for TRENDS®

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

X Y 0 1 2 3 1 1 2 3 1 1

2. Measurement Date

1 1 9 9 7 0 9 1 3

3. Initials of Recorders

P Q R S T U

4. Contractor

A S P E N

For areas where natural regeneration is intended to be the major regeneration method:

5. Quadrant	6. Species	7. Distance (m)	8. Direction	9. Crop Rating
1	Sx	7	N	1
1	Sx	15	N	3
1	PLi	22	N	2
1	Sx	17	E	7
1	Sx	21	E	4
1	Sx	80	E	1
1	PLi	8	S	1
1	PLi	90	S	1
1	Sx	95	S	1
2	Sx	22	N	1
2	Sx	37	N	1
2	PLi	45	N	1
2	PLi	8	N	2
2	Sx	30	E	2
2	PLi	40	E	5
2	PLi	60	S	7
2	Sx	65	S	1
2	PLi	90	W	1
3	Sx	60	N	1
3	Sx	160	N	2
3	PLi	6	E	3
3	PLi	70	E	4
3	Sx	60	E	7
3	Sx	130	S	1
4	Sx	30	N	1
4	PLi	60	N	1
4	Sx	55	E	1
4	PLi	30	S	1
4	Sx	160	S	1
4	PLi	17	W	1

CONE CROP RATINGS for TRENDS®

CONE CROP RATING

- Complete the *Cone Crop Rating* form in installations where natural regeneration is intended to be a significant form of regeneration.
- Standing at quadrant centre, visually assess the relative number of cones in the cone-bearing portion of representative dominant and co-dominant tree crowns in the four cardinal directions.
- Observe both the number of cones on cone-bearing trees and the percentage of trees bearing cones in the view.
- Rate the cone crop in each cardinal direction numerically from none to very heavy (see *Cone Crop* table, cell 9).
- Repeat for each quadrant.
- Refer to the cone collecting guide¹ for details regarding species cone production characteristics.

¹ R.D. Eremko, D.G.W. Edwards, and D. Wallinger. A Guide to Collecting Cones of British Columbia Conifers. January 1989.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.
5. Enter the **Quadrant Number** that you are in, 1 to 4.
6. **Species:** Refer to the Stand description table, cell 9.
7. Enter the **Distance (m)** from quadrant centre to cone bearing trees.
8. Enter the **cardinal direction N, S, E, or W**; See Administration table, cell 14 for format.

9. Cone crop rating (from A Guide to Collecting Cones of B.C. Conifers, page 20)	Field Guide Pg.: n/a	Form: Cone crop rating
Code Definition	Acceptable Codes	
none; no cones	1	
very light; few cones on less than 25% of the trees	2	
light; few cones on more than 25% of the trees	3	
light; many cones on less than 25% of the trees	4	
medium; many cones on 25-50% of the trees	5	
heavy; many cones on more than 50% of the trees	6	
very heavy, many cones on almost all of the trees	7	
Field type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: medium crop	5

**Attributes of Repeatedly
Measured Trees**

Subplot Densities and Regeneration/Plantable Spot Survey

- Cell 13. Damaging Agents
should read:
See the Stand Description table, cells 17 and 18, record the number of stems infected.
- Cell 14. Please note that you now have the choice of four forms for this section. Use one or two of the modified forms depending on whether you are dealing with a single storied stand or a multi-storied stand and are conducting a "stocking/Free Growing survey" or a "Free Growing" survey, or both. New blank forms are attached to this document.
- Cell 15. Free Growing
change
range = 0 - 75

Site Disturbance

- Cell 5. Disturbance Type
add
Compacted Area = A
Corduroy Road = Y
change
115.5 to 115.0 under the Distance column.
See write up under Disturbance Type: change to "if no disturbance exists at that spot, or it cannot be classified, simply..."
- Cell 6. Depth
change
range = 0-50
- Cell 7. See write up under Forest Floor Displacement: add: "In cases where there is no classifiable Disturbance type, but there is Forest Floor Displacement, record a "-" under Disturbance Type and a "1" under Forest Floor Displacement.

Repeatedly Measured Trees

- Cell 26. Tree DBH
change
range = 0.5-50

Competition Description

- Cell 13. Vegetation in 45° Cone
add
"C" below "B2" and corresponding cells for proximity distance.
- Cell 6. Percent Cover
See tables
delete
"Refer to Vegetation table cell 8 for format." This is not correct as you are to record individual percentages, not just "1" for anything under 5 percent.

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

Card | | of |

1. Obligation No.											
Timbermark			C.P.		Block			Installation			

Ref. No.	2. Measurement Date (yr/m/d)	3. Initials of Recorders	4. Contractor
1	2 0		
2	2 0		
3	2 0		
4	2 0		
5	2 0		
6	2 0		
7	2 0		
8	2 0		

5. Quadrant No.				
6. Grid No.				
7. Tree No.				

8. Species			
9. RMT & CD			
10. Origin			
11. Seedling position (cm)			
12. Seedling position on MPA			
13. Microtopography			
14. Rooting Media			

15. Harvest Ref. No.					
16. Site Prep. Ref. No.					
17. Stock. Stand. Ref. No.					
18. Art. Regen. Ref. No.					
19. Tending Ref. No.					

Notes:

Notes:

"MPA" = Mechanically Prepared Area. Complete if and only if the installation was mechanically site prepared (Site preparation technique on the Administration form is "ME"). The area may contain 'undisturbed ground'.

"a.i" = annual increment, i.e. length of leader that year. Record only if not recorded in a previous year.

Date Ref. No.					1	2	3	4	5	6	7	8
20. Current yr. leader (cm)												
21. yr			a.i. (cm)									
yr			a.i. (cm)									
yr			a.i. (cm)									
yr			a.i. (cm)									
yr			a.i. (cm)									
yr			a.i. (cm)									
22. Height (cm)												
23. Height to live crown (cm)												
24. Radial crown width (cm)												
25. DBH (cm)												
26. GLD (mm)												
27. Single/Multiple Leader												
28. Vigour												
29. Damaging agent												
Severity												
Damaging agent												
Severity												
Damaging agent												
Severity												

[illegible]

ATTRIBUTES OF REPEATEDLY MEASURED TREES for TRENDS®

June 6, 2000

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

Card 3 of 12

1. Obligation No.

Timbermark C.P. Block Installation

F	C	7	6	0	1		6	2			9	2
---	---	---	---	---	---	--	---	---	--	--	---	---

Ref. No.

2. Measurement Date (yr/m/d)

3. Initials of Recorders

4. Contractor

5. Quadrant No.

6. Grid No.

7. Tree No.

8. Species

9. RMT & CD

10. Origin

11. Seedling position (cm)

12. Seedling position on MPA

13. Microtopography

14. Rooting Media

15. Harvest Ref. No.

16. Site Prep. Ref. No. _____

17. Stock. Stand. Ref. No.

18. Art. Regen. Ref. No.

19. Tending Ref. No.

Notes:

Notes:
"MPA" = Mechanically Prepared Area. Complete if and only if the installation was mechanically site prepared (Site preparation technique on the Administration form is "ME"). The area may contain 'undisturbed ground'.

"a.l" = annual increment, i.e. length of leader that year. Record only if not recorded in a previous year.

Date	Ref. No.	1	2	3	4	5	6	7	8
20. Current yr. leader (cm)		19.0	12.0	13.5	11.0	16.5	16.0	.	.
21. yr	2003 a.l. (cm)	.	.	.	14.0	.	.	.	.
yr	2005 a.l. (cm)	.	.	.	.	7.0	.	.	.
yr	2008 a.l. (cm)	.	.	.	.	.	17.0	.	.
yr	2007 a.l. (cm)	.	.	.	.	.	15.3	.	.
yr	a.l. (cm)	.	.	.	.	.	.	.	.
yr	a.l. (cm)	.	.	.	.	.	.	.	.
22. Height (cm)		39	51	65	90	113	161	.	.
23. Height to live crown (cm)		0	7	7	15	19	20	.	.
24. Radial crown width (cm)		8	9	12	15	17	30	.	.
25. DBH (cm)		.	.	.	.	.	1.1	.	.
26. GLD (mm)		7	12	14	20	24	42	.	.
27. Single/Multiple Leader		S	S	S	S	S	S	.	.
28. Vigour		3	3	3	3	3	3	.	.
29. Damaging agent				LAG		LAG			
Severity				5		2			
Damaging agent									
Severity									
Damaging agent									
Severity									

[illegible]

ATTRIBUTES OF REPEATEDLY MEASURED TREES for TRENDS®

June 6, 2000

REPEATEDLY MEASURED TREES

1 Purpose in monitoring protocol:

The data collected on these forms are the cornerstone of the *TRENDS*© protocol and provide the information required to satisfy all but one of the eight monitoring objectives. One of these forms is completed for each Repeatedly Measured Tree (RMT).

2 RMT Selection Criteria:

The types of trees to be selected as RMTs are designated by the member on the *Administration* form in the sections entitled "Selection Criteria for Repeatedly Measured Trees with Competition Description" or "Selection Criteria for Repeatedly Measured Trees without Competition Description". **Contractors must insure that they have discussed these selection criteria in detail with their members prior to their selecting RMTs in the field.** Please see Section 4.2.4 in the front portion of this manual for more instructions on selecting RMTs. At least one "species-type" must be designated as RMT+CD on each installation where regeneration after harvest is to be monitored (i.e., RMTs are not required in commercially thinned installations). Also, the same selection criteria must be implemented at each grid plot. In other words, one of each species-type listed in the Selection Criteria for RMT section of the *Administration* form must be selected on each grid plot, if present.

Therefore, consider the number of trees of each species-type likely to be growing on the installation, when determining RMT selection criteria. Visiting an installation to measure less than 18 RMTs in total is not thought to be economically feasible. On the other hand, measuring more than 100 trees on an installation may not be practical. **Contractors must discuss with their members the practicality and feasibility of the selection criteria before visiting the installation**

2.1 RMT Selection Criteria in Partial Harvest Situations:

The purpose of the RMTs is to monitor **regeneration** (be it advanced, or that which occurs after the harvest treatment). They are not intended to track the development on overstory trees that are already on site prior to harvest. Therefore, beginning in the 2000 field season, only trees in layers A4, A5, and A6 are eligible to be chosen as RMTs. In installations where a partial harvest system has been implemented, or a commercial thinning activity carried out, trees larger than layer A4, i.e., 7.5 cm dbh and larger, are not selected as RMTs and do not have *Competition Description* information collected. This component of the stand (layers A0 to A3) is assessed as for pre-harvest situations, on an area basis, and recorded on the *Stand Description* form. These trees are re-measured according to the schedule for the *Stand Description* form. The data are used to monitor stand attributes, as opposed to individual tree development. RMTs in layers A4, A5, and A6 may still be selected and measured on partially harvested and commercially thinned installations and have their *Competition Description* information collected.

The problem is that a one- to two-year old seedling/sucker has a high probability of dying within the first few years. Random sampling of a single individual at each grid point may mean that there are no RMTs on an installation by year five after selecting. The *TRENDS* protocol has been designed to allow for replacement of RMTs if mortality occurs, or to add RMTs over time. **Once seedlings/suckers are present post-harvest, select one RMT closest to the grid point; tag and number that tree. Select 3 other "extra" individuals by going out one metre in the 3 cardinal directions from the initial tree selected (see Figure 1 in this section) and select the individual closest to the 1-metre point.** This is systematic sampling with a random start. Do not number, or measure, these individuals, but identify them somehow with flagging, spot of paint on stem, coloured plastic straw in ground, etc. These "extras" will be used in the future to replace the original RMT if it dies. A new tree number must be assigned to a RMT that is a replacement. By identifying the "extras" at the same time that the RMT closest to the grid point is selected, replacement trees will be of the same age as the original. This will allow the monitoring of cohorts by measuring individuals with replacement.

Option 3: The information requirements and problems are as for Option 2:

Once seedlings/suckers are present post-harvest, select 4 individuals in each grid plot using the same methodology as in Option 2. Tag, number and measure each individual. All four RMTs will be measured on every measurement date for the duration of monitoring (usually 15 years) if all four survive. Since they are being selected when mortality is expected to be high, it is likely some will die during the 15 years. The hope is that enough individuals will survive to provide a population sample for the duration of the monitoring. The number of individuals going into the means and other statistics over time will decrease with this method. More than four individuals could be initially selected by continuing the systematic sampling method, but if all survive for many years, all trees must be measured on every measurement date at some expense. RMTs that die could also be replaced with new trees and new tree numbers as always. If individuals that germinated or suckered at the same time as the dead tree were not initially marked, a tree of approximately the same age should be selected by counting annual growth increments.

3.2 Choosing RMTs in Part Installations:

Occasionally after harvest, part of an installation may be in an area that is no longer part of the Net Area to be Reforested (NAR), because of a permanent road through the block or because block boundaries have been moved. If this occurs, grid points should be set up within the portion of the installation that is within the NAR (i.e. within the block boundary and not on a permanent road). RMTs are only selected at these grid points that are within the NAR. Follow the instructions given in 4.1 above to ensure that a suitable number of RMTs are selected.

4 Measuring Annual Increments:

Each year's growth increment is recorded only once. Annual growth increments from previous years are collected only when trees are not measured each year.

For example, a 1+0 seedling planted in the spring of 1997 would have its total height and leader measured in 1997, 1998, and 1999 (referred to as years 1, 2 and 3 in the schedule). Previous years' measurements would not be collected in 1998 and 1999 because we already measured those increments as leaders in the year that they grew. Since the schedule does not call for measurements in year 4 (in this case 2000), when we go back to this tree in year five (2001), we measure the total height, leader (year 2001 growth), and the year 2000's growth.

Cell 21 on the *Attributes of Repeatedly Measured Trees* form is designed to allow "2000" to be recorded in the same row as its measurement, to specifically identify the year in which the increment grew. Only one measurement for one year is ever entered in one row in this section of the form. When an additional year's growth is recorded, its calendar year is recorded on the next row and the corresponding growth measurement is recorded in the column below the current year's measurement.

Please see the attached completed form as an example.

5 Key points for measuring growth on damaged trees:

- It is important to measure what grew. For example, in the case of damage or dieback to the leader, where the damaged or dead portion is still present, include the damaged or dead portion in the measurement.
- The new leader determines the starting point for measuring annual increments. For example, if a branch has curved upward to become a new leader, the terminal section is measured as the leader. The previous year's growth on that section is recorded as the annual increment, regardless of whether or not it was actually the leader when it grew. Do not try to determine which section was the actual leader when measuring annual increments on damaged trees.
- You can only measure what you can see or what you can infer from other parts of the tree. Counting annual increments along lateral branches back to the stem can help explain what happened.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the *Administration Form*.
2. **Measurement Date:** Enter the date on which the information was collected. See *Administration Table*, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See *Administration Table*, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See *Administration Table*, cell 18 for format.

5. Quadrant Number	Field Guide Pg: n/a	Form: Attributes of RMTs
Code Definition	Acceptable Codes	
Record the quadrant number in which the repeatedly measured tree is located. Refer to Figure 1 in the front section of this manual for numbering of quadrants.	1 - 4	
Field type: Numeric	Justification: n/a	
Precision: n/a	Example entry: Quadrant number 4	4

6. Grid point number	Field guide pg.: n/a	Form: Attributes of RMTs
Code Definition	Acceptable codes	
Enter the number of the grid point closest to the selected repeatedly measured tree. Refer to figure 1 in the front section of this manual for numbering of grid points.	1 - 36	
Field Type: Numerical	Justification: Right	
Precision: n/a	Example Entry: Grid Point 24	2 4

7. Repeatedly Measured Tree Number	Field Guide Pg.: n/a	Form: Attributes of RMTs
Code Definition	Acceptable Codes	
Record the number of the repeatedly measured tree with the letter 'R' in front of the number.	Whole number >0 preceded by letter 'R'	
Field type: Character/Numeric	Justification: n/a	
Precision: n/a	Example entry: RMT number 89	R 0 8 9

8. **Species:** Refer to the *Stand Description* table, cell 9.

9. RMT & CD	Field Guide Pg.: n/a	Form: Attributes of RMTs
Code Definition	Acceptable Code	
RMT with Competition Description	Y	
RMT without Competition Description	N	
Field type: Character	Justification: n/a	
Precision: all RMTs with CD must have a CD form	Example entry: Selected as a RMT with CD	Y

13. Microtopography	Field Guide Pg.: A-1 on microscale	Form: Attributes of RMTs
Visualize a 1 m by 1 m microsite with the seedling in the centre. Describe the microtopography in relation to the general slope elevation 5 m up and down slope.		
Code Definition	Acceptable Codes	
crest	a	
upper slope	b	
middle slope	c	
lower slope	d	
toe	e	
depression	f	
level	g	
Field type: Character	Justification: n/a	
Precision: n/a	Example entry: on crest of mound	a

14. Rooting Media	Field Guide Pg.: n/a	Form: Attributes of RMTs
mainly humus (>75%)	H	
mainly mineral soil (>75%)	M	
mainly organic material (>75%) i.e. organic soil	O	
blended (anything less than 75% humus, mineral soil, or organic. Also includes mechanically mixed soil and humus)	B	
countable site degradation	S	
Rotting wood	R	
Field type: Character	Justification: Left, can enter 2 codes	
Precision: n/a	Example entry: 90% mineral soil and countable disturbance	M: S

Refer to the *Administration* form and record the appropriate reference number for the following cells, 15 - 19: Note: It is essential that the correct reference numbers are recorded for each RMT to insure that the RMTs are accurately linked to the treatments that have been applied.

15. Harvesting/Disturbance Ref. No.

16. Site preparation Ref. No.

17. Stocking Standards Ref. No.

18. Artificial Regeneration Ref. No. If a seedlot mix of a species is planted so that the seedlot for an individual tree is not known, then enter the reference numbers for all possible seedlots.

19. Stand Tending Ref. No.

23. Height to Live Crown (cm)	Field Guide Pg.: n/a	Form: Attributes of RMTs
Code Definition	Acceptable Codes	
Measure from the base of the tree to the base of where live crown starts.	0 - 1500	
Field type: Numeric	Justification: Right	
Precision: nearest 1 cm for trees < 3 m, nearest 10 cm for trees > 3 m	Example entry: 11 cm	1 1

24. Radial Crown Width (cm)	Field Guide Pg.: n/a	Form: Attributes of RMTs
Code Definition	Acceptable Codes	
Measure the average radius from the tree bole to the edge of the crown drip zone.	0 - 500	
Field type: Numeric	Justification: Right	
Precision: nearest 1 cm for trees < 3 m, nearest 10 cm for trees > 3 m	Example entry: 10 cm	1 0

25. Tree DBH (cm)	Field Guide Pg.: n/a	Form: Attributes of RMTs
Code Definition	Acceptable Codes	
Record for trees with a measurable DBH, but do not measure DBH on a leader.	0.5 - 25.0	
Field type: Numeric	Justification: Right	
Precision: nearest 0.1 cm	Example entry: 7.3 cm	7 . 3

26. Ground Line Diameter (GLD) (mm)	Field Guide Pg.: n/a	Form: Attributes of RMTs
Ensure that trees are not damaged by calipers when taking measurements. Measure on trees up to 2.0 m in height (or when stem begins to taper) to correlate GLD to DBH. Trees taller than 2 m have Diameter at Breast Height (DBH) recorded only.		
Code Definition	Acceptable Codes	
Measure the ground line diameter to the nearest mm.	1 - 100	
Field type: Numeric	Justification: Right	
Precision: nearest mm	Example entry: 28 mm	2 8

27. Single vs. Multiple Leader	Field Guide Pg.: n/a	Form: Attributes of RMTs
Code Definition	Acceptable Codes	
To be declared single leader the terminal shoot must be more than twice the length of any competing shoot.		
Single Leader	S	
Multiple Leaders	M	
Field type: Character	Justification: n/a	
Precision: n/a	Example entry: single leader	S

Competition Description

Subplot Densities and Regeneration/Plantable Spot Survey

- Cell 13. Damaging Agents
should read:
See the Stand Description table, cells 17 and 18, record the number of stems infected.
- Cell 14. Please note that you now have the choice of four forms for this section. Use one or two of the modified forms depending on whether you are dealing with a single storied stand or a multi-storied stand and are conducting a "stocking/Free Growing survey" or a "Free Growing" survey, or both. New blank forms are attached to this document.
- Cell 15. Free Growing
change
range = 0 – 75

Site Disturbance

- Cell 5. Disturbance Type
add
Compacted Area = A
Corduroy Road = Y
change
115.5 to 115.0 under the Distance column.
See write up under **Disturbance Type**: change to "if no disturbance exists at that spot, or it cannot be classified, simply..."
- Cell 6. Depth
change
range = 0-50
- Cell 7. See write up under **Forest Floor Displacement**: add: "In cases where there is no classifiable Disturbance type, but there is Forest Floor Displacement, record a "-" under Disturbance Type and a "1" under Forest Floor Displacement.

Repeatedly Measured Trees

- Cell 26. Tree DBH
change
range = 0.5-50

Competition Description

- Cell 13. Vegetation in 45° Cone
add
"C" below "B2" and corresponding cells for proximity distance.
- Cell 6. Percent Cover
See tables
delete
"Refer to Vegetation table cell 8 for format." This is not correct as you are to record individual percentages, not just "1" for anything under 5 percent.

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark	C.P.	Block	Installation
<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>

2. Measurement Date

y	m	d	
<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>

Card of

3. Initials of Recorders

4. Contractor

5. Tree No.

6. Veg cover (%) in 1 m cylinder

7. Modal ht. of veg (cm) in 1 m cyl.

8. Species (top 5 competitors)

	9. % Cover								
	10. Ht (cm)								
	11. Distrib.								
	12. Prox. (cm)								
	%Cover								
	Ht. (cm)								
	Distrib.								
	Proximity								
	%Cover								
	Ht. (cm)								
	Distrib.								
	Proximity								
	%Cover								
	Ht. (cm)								
	Distrib.								
	Proximity								
	%Cover								
	Ht. (cm)								
	Distrib.								
	Proximity								

13.

Vegetation
in 45° Cone
by layer

A	0	Proximity (m)							
A	1	"							
A	2	"							
A	3	"							
A	4	"							
A	5	"							
B	1	"							
B	2	"							
C		"							

Tree No.

Veg cover (%) in 1 m cylinder

Modal ht. of veg (cm) in 1 m

Species (top 5 competitors)

	9.								
	10.								
	11.								
	12.								
	9.								
	10.								
	11.								
	12.								
	9.								
	10.								
	11.								
	12.								
	9.								
	10.								
	11.								
	12.								
	9.								
	10.								
	11.								
	12.								

13.

A	0	Proximity (m)							
A	1	"							
A	2	"							
A	3	"							
A	4	"							
A	5	"							
B	1	"							
B	2	"							
C		"							

Tree No.

Veg cover (%) in 1 m cylinder

Modal ht. of veg (cm) in 1 m

Species (top 5 competitors)

	9.								
	10.								
	11.								
	12.								
	9.								
	10.								
	11.								
	12.								
	9.								
	10.								
	11.								
	12.								
	9.								
	10.								
	11.								
	12.								
	9.								
	10.								
	11.								
	12.								

13.

A	0	Proximity (m)							
A	1	"							
A	2	"							
A	3	"							
A	4	"							
A	5	"							
B	1	"							
B	2	"							
C		"							

Guidelines for recording competing vegetation.

Record competing species within the 1 m cylinder, and their attributes, for each of the following criteria.
One species may represent more than one criteria, but each criteria must be addressed:

1. tallest
2. most percent cover
3. of modal height
4. closest 1% (single stems not amounting to 1% do not qualify)
5. shrub or tree
6. list enough species to describe at least 75% of the total veg. cover in 1 m cylinder (cell 6 above).

COMPETITION DESCRIPTION for TRENDS®

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark C.P. Block Installation
A B 0 0 4 5 **4 5** **3 1** **1 1**

2. Measurement Date

1 1 9 9 7 0 7 1 8

Card **11** of **12**

3. Initials of Recorders

B A P I A G

4. Contractor

T R E E S I N C

5. Tree No.

R 0 0 1

6. Veg cover (%) in 1 m cylinder

6 0

7. Modal ht. of veg (cm) in 1 m cylinder

7 5

8. Species (top 5 competitors)

R U B U P A R

9. % Cover **2 5**

10. Height(cm) **7 8**

11. Distrib. **5**

12. Prox. (cm) **1 0**

R I B E L A X

%Cover **2 0**

Height **6 8**

Distrib. **5**

Proximity **1 0**

D R Y O E X P

%Cover **1 0**

Height **6 0**

Distrib. **5**

Proximity **1 3**

A T H Y F I L

%Cover **1**

Height **7 2**

Distrib. **3**

Proximity **9 3**

T I A R T R I

%Cover **1**

Height **3 1**

Distrib. **5**

Proximity **1 0**

13.

Vegetation
In 45° Cone
by layer

A	0	Proximity (m)	55.5
A	1	"	.
A	2	"	21.0
A	3	"	.
A	4	"	0.0
A	5	"	.
B	1	"	2.3
B	2	"	.

Tree No.

R 0 0 3

Veg cover (%) in 1 m cylinder

4 0

Modal ht. of veg (cm) in 1 m

7 5

Species (top 5 competitors)

R U B U P A R

9. **2 5**

10. **7 2**

11. **5**

12. **1 0**

A C E R G L A

9. **1 0**

10. **1 0 5**

11. **4**

12. **8 0**

D R Y O E X P

9. **7**

10. **6 0**

11. **5**

12. **1 3**

C A R E P O D

9. **1**

10. **8 2**

11. **3**

12. **6 2**

G Y M N D R Y

9. **1**

10. **4 0**

11. **5**

12. **1 5**

13.

A	0	Proximity (m)	51.5
A	1	"	.
A	2	"	.
A	3	"	.
A	4	"	0.0
A	5	"	.
B	1	"	1.5
B	2	"	.

Tree No.

R 0 0 4

Veg cover (%) in 1 m cylinder

2 5

Modal ht. of veg (cm) in 1 m

4 2

Species (top 5 competitors)

R U B U I D A

9. **5**

10. **7 0**

11. **5**

12. **1 0 0**

S A M B R A C

9. **5**

10. **6 2**

11. **3**

12. **7 5**

S A L I X

9. **1**

10. **6 0**

11. **3**

12. **1 0 0**

E Q U I S E T

9. **1 0**

10. **2 5**

11. **7**

12. **1 0**

H E R A L A N

9. **1**

10. **1 2 0**

11. **3**

12. **7 0**

13.

A	0	Proximity (m)	50.0
A	1	"	.
A	2	"	.
A	3	"	1.2
A	4	"	.
A	5	"	.
B	1	"	.
B	2	"	1.2

COMPETITION DESCRIPTION for TRENDS®

COMPETITION DESCRIPTION (for those species competing with the Repeatedly Measured Trees.)

These measurements are only done on those trees specifically designated as "Repeatedly Measured Trees with Competition Description". This form is not completed for all Repeatedly Measured Trees (RMT). The trees for which these measurements apply will be designated by the member on the *Administration* form.

The competition description measurements are collected and recorded on the *Competition Description* form as follows:

1. Record the number of the RMT being assessed.
2. Imagine a cylinder 1 m in radius around the RMT:
 - Record the percent cover of all vegetation (including trees (A), shrubs (B), herbs (C) and mosses (D), even if it is only their foliage) within the 1 m cylinder.
 - Record the most frequent (i.e. modal) height of the vegetation within the 1 m cylinder.
3. Within the 1 m cylinder:
 - Record the five species that are competing most with that tree for light, water or nutrients. Record these in the spaces provided under cell reference 8. All species whether they are trees, shrubs or herbs should be considered. Record only those plants with their stems in the 1 m cylinder (those outside the cylinder will be dealt with in No. 4 below). The decision as to whether the species is a top competitor or not is made by the assessor and is based on the volume of vegetation that is within that 1 m cylinder and its proximity to the RMT.
 - Record the percent cover for each of the species listed (do not list any species with <1% cover).
Note: The total of the percent covers for the top five species **must** be consistent with, but not necessarily be equal to, the total percent cover for all the vegetation; i.e. if all species present are listed and there is some overlap, then the individuals totalled may be greater than the total for all. Always check your numbers to make sure that they make sense.
 - Record the modal height for each species listed.
 - Record the distribution code for each species listed.
 - Record the proximity, to the nearest centimeter, for each species listed. Proximity is defined as the radius of the circle (with the RMT as its centre) that incorporates 1% cover of the species.
4. Once the top five competing species in the 1 m cylinder have been recorded, note any vegetation that intercepts a line projected at a 45 degree angle from the base of the RMT and record their proximities by layer under cell 13 (See Figure 1 for a diagram of which competing vegetation to record).
 - Individual species are not recorded, only the layer. For residual trees left post-harvest, estimate the layer that they likely occupied in the pre-harvest stand.
 - Record proximities for only those layers that have **not** already been recorded in the species listed as being within the 1 m cylinder. For example, if Black twinberry >1.3 meters (i.e. a "B1" layer) was listed as a species within the cylinder, then do not list B1's again under cell 13. However, if Black twinberry <1.3 m (B2) was recorded within the 1 m cylinder and another Black twinberry > 1.3 m (B1) was intercepted by the 45 degree angle cone, and that was the closest B1 to the RMT, then record that B1 and its proximity.
 - Proximity for these layers is recorded as the horizontal distance, to the nearest tenth of a meter, from the RMT to the first contact with the competing vegetation. Plants with their stems outside the 1 m cylinder, but with their foliage overtopping the RMT have a proximity of "0".

A note about trees vs. shrubs:

The same species may be labelled as either a tree or a shrub depending on the growth habit that it is exhibiting. Alders, willows, birch, and some maples, to name just a few, are examples of species that could be growing in both tree and shrub forms on the same site. For consistency, we will define a tree as having one well-defined stem.

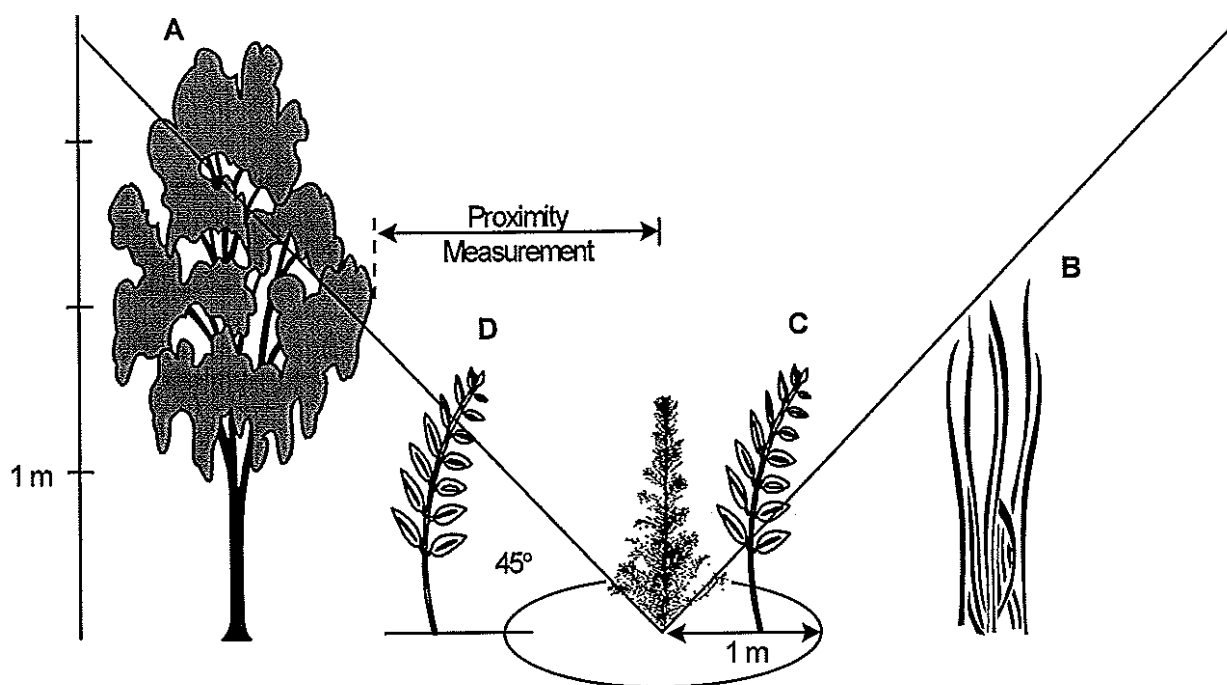


Figure 1. Which competing species to record.

In the above example, starting with the 1 m cylinder, only species "C" would be listed as a top competitor (since it is the only one within the 1 m cylinder). Next, looking at the 45 degree angle from the base of the RMT, species "B" would not be recorded because it does not intercept the line. Species "D" would not be listed either; although it does intercept the line, the same layer was already recorded within the 1 m cylinder. The proximity for species "A" would be recorded across from the appropriate layer code under cell 13 on the *Competition Description* form.

1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.
5. **Tree no:** Enter the appropriate number of the Repeatedly Measured tree (RMT).
6. **Vegetation cover (%) in 1 m cylinder:** Enter the percent vegetation cover within a 1 m radius of the RMT. Refer to the Vegetation table, cell 8 for format.
7. **Modal Height of vegetation (cm) in 1 m cylinder:** Enter the most frequent height in cm for the vegetation within a 1 m radius of the RMT.
8. **Vegetation Species:** Record only the top five competing species. See the Vegetation table, cell 7 for species codes for shrubs, herbs and mosses. For tree species, use the following table of acceptable codes.

8. Tree Species		Field Guide Pg.: n/a	Form: Competition Description
Code Definition		Acceptable Codes	
Tree Species Common Name	Tree Species Latin Name and Reference ¹	Code	
Black cottonwood	<i>Populus trichocarpa</i> Torr. & A. Gray	POPUTRI	
Balsam Poplar	<i>Populus balsamifera</i> L.	POPUBAL	
Trembling aspen	<i>Populus tremuloides</i> Michx.	POPUTRE	
Amabilis fir	<i>Abies amabilis</i> (Dougl. ex Loud.) Dougl. ex J. Forbes	ABIEAMA	
Balsam fir	<i>Abies balsamea</i> (L.) Mill.	ABIEBAL	
Grand fir	<i>Abies grandis</i> (Dougl. ex D. Don) Lindl.	ABIEGRA	
Subalpine fir	<i>Abies lasiocarpa</i> (Hook.) Nutt.	AGIELAS	
Noble fir	<i>Abies procera</i> Rehd.	ABIEPRO	
Western red cedar	<i>Thuja plicata</i> Donn ex D. Don	THUJPLI	
Red alder	<i>Alnus rubra</i> Bong.	ALNURUB	
Speckled alder	<i>Alnus incana</i> ssp. <i>rugosa</i> (Du Roi) J. Clausen	ALNUINC	
Sitka alder	<i>Alnus viridis</i> ssp. <i>sinuata</i> (Regel) A. Löve & D. Löve	ALNUSIN	
Green alder	<i>Alnus viridis</i> ssp. <i>crispa</i> (Ait.) Turill	ALNUCRI	
Siberian alder	<i>Alnus viridis</i> ssp. <i>fruticosa</i> (Rupr.) Nym.	ALNUFRU	
Paper birch	<i>Betula papyrifera</i> Marsh.	BETUPAP	
Douglas-fir - interior variety	<i>Pseudotsuga menziesii</i> var. <i>glauca</i> (Beissn.) Franco	PSEUGLA	

¹ Farrar, J.L. 1995. Trees in Canada. Fitzhenry & Whiteside Limited. Markham, Ontario.

8. Tree Species		Field Guide Pg.: n/a	Form: Competition Description
Code Definition		Acceptable Codes	
Douglas-fir - coastal variety	Pseudotsuga menziesii (Mirb.) Franco var. menziesii	PSEUMEN	
Mountain hemlock	Tsuga mertensiana (Bong.) Carrière	TSUGMER	
Western hemlock	Tsuga heterophylla (Raf.) Sarg.	TSUGHET	
Alpine larch	Larix lyallii Parl.	LARILYA	
Tamarack	Larix laricina (Du Roi) K. Koch	LARILAR	
Western Larch	Larix occidentalis Nutt.	LARIOCC	
Whitebark pine	Pinus albicaulis Engelm.	PINUALB	
Limber pine	Pinus flexilis James	PINUFLE	
Jack pine	Pinus banksiana Lamb.	PINUBAN	
Lodgepole pine - interior variety	Pinus contorta Dougl. ex Loud. var. latifolia Engelm.	PINULAT	
Lodgepole pine - coastal variety	Pinus contorta Dougl. ex Loud. var. contorta	PINUCON	
Western white pine	Pinus monticola Dougl. ex D. Don	PINUMON	
Ponderosa pine/Yellow pine	Pinus ponderosa P. Laws. ex C. Laws.	PINUPON	
Black spruce	Picea mariana (Mill.) BSP	PICEMAR	
Sitka spruce	Picea sitchensis (Bong.) Carrière	PICESIT	
Engelmann spruce	For Alberta only Picea engelmannii Parry ex Engelm.	PICEENG	
White spruce	For Alberta only Picea glauca (Moench) Voss	PICEGLA	
Interior spruce = white, Engelmann and hybrids	For BC only	PICEENE	
Willow	Salix sp.	SALI	
Yellow cedar	Chamaecyparis nootkatensis (D. Don) Spach	CHAMNOO	
Field type: Character		Justification: Left	
Sampling Standard: n		Example entry: Interior Lodgepole pine	
		P I N U L A T	

9. **Percent Cover:** See the Vegetation table, cell 8 for format. Record only the top five competing species whose stems originate from within the 1 m circle around the RMT.
10. **Modal Species Height (cm):** Enter the most frequent height in cm for each species. See cell 7 above for format.
11. **Distribution Codes:** See the Vegetation table, cell 9.

12. Proximity to vegetation within the 1 m radius cylinder (cm)	Field Guide Pg.: n/a	Form: Competition Description
Code Definition	Acceptable Codes	
Using the RMT as centre, measure the radius of the circle that would incorporate 1% of the competing vegetation for each species.	10-100	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 5 cm	Example Entry: 13 cm	1 3

13. Proximity to vegetation intercepted by a line projected at 45° from the base of the RMT.	Field Guide Pg.: n/a	Form: Competition Description
Code Definition	Acceptable Codes	
Estimate the distance from the RMT to the nearest competing tree or shrub within each layer. If an individual tree or shrub outside the 1m radius overhangs the crop tree, record proximity as 0. See Figure 1 for description of which competing vegetation to include.	0.0-55.0	
Field type: Numeric	Justification: Right	
Sampling Standard: ± 0.5 m	Example Entry: 5.5 m	5 5

Coarse Woody Debris

Coarse Woody Debris

Cell 7. Diameter
change
range = 8 – 999 if shape code = A in Cell 15.

Cell 14. Length
change
range = 0-60

Cell 16. Depth of Accumulation
change
range = 30-300

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

2. Measurement Date

1

1

1

3. Initials of Recorders

4. Contractor

5. Card of

[illegible]

Comments:

COARSE WOODY DEBRIS SURVEY for TRENDS®

COARSE WOODY DEBRIS SURVEY for TRENDS®

Timbermark

C.P.

Block

Installation

2. Measurement Date

3. Initials of Recorders

0	3	A	0	6	9			6	9			5	4	2
---	---	---	---	---	---	--	--	---	---	--	--	---	---	---

y	1	9	9	7	0	9	0	9
---	---	---	---	---	---	---	---	---

N	P	O	B	X	Y
---	---	---	---	---	---

4. Contractor

D	E	N	D	R	O		
---	---	---	---	---	---	--	--

5. Card 1 of 1

Comments:
rock bluff
prevented
full 30 m.
transect

COARSE WOODY DEBRIS¹

Coarse woody debris (CWD) is a major contributor to structural diversity in forests and provides habitat for plants, mammals, amphibians, insects, and micro-organisms. It influences hillslope and stream geomorphology, affects the microtopography and microclimate of the forest floor, is an important nutrient and moisture pool, and in some ecosystems, may be a nitrogen fixation site. In the *TRENDS*® protocol, these data will be used to address monitoring objective 7, and as a grouping variable.

Coarse woody debris, for the purpose of this monitoring protocol, is **dead woody material located above the soil**, in various stages of decomposition. CWD must be **larger than 7.5 cm in diameter** (or equivalent cross section) at the crossing point, and **not self-supporting**. Trees and stumps (intact in ground) are considered self supporting. CWD can also be in the form of felled and bucked logs or log decks.

For the *TRENDS*® Protocol, CWD is recorded along 2-15 meter transects at 90° to each other, meeting at the SW corner of the installation. It is important to follow this path, as shown in Figure 1 below, so that **CWD measurements are always taken along the same transect**. This way, CWD measurements can be compared from year to year. Starting at the "start" point, assess each piece of CWD crossed by the 30 m transect and record the required information on the *Coarse Woody Debris* form. Suspended CWD, as well as that lying on the soil surface, is sampled since the transect line is a vertical plane intercept. Unmeasurable suspended pieces will be visually estimated at the intercept point.

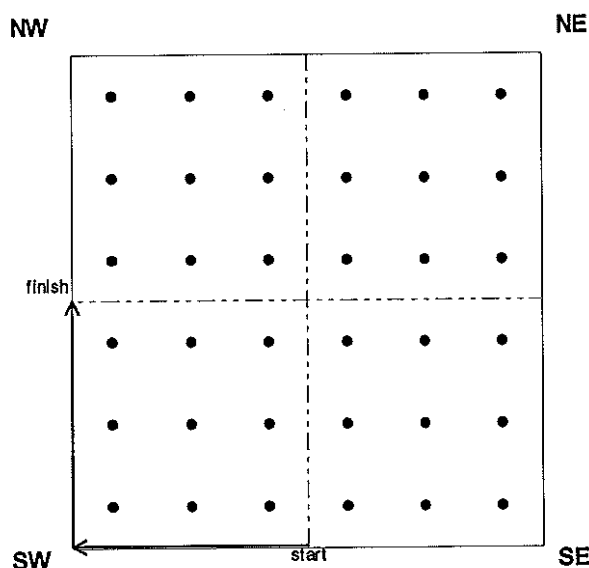


Figure 1: Coarse Woody Debris Transect.

¹Modified from BC Ministry of Forests, Resources Inventory Branch. 1997. Vegetation Resources Inventory Sampling Procedures. B.C. Min. For., Resources Inventory Branch, Victoria, B.C. pp. 8:1-13.

Normally, the full length of the transect will be sampled. However, because the installations are randomly located, unsafe or difficult conditions may be encountered and you may be unable to sample the full length. If the full length of the line cannot be sampled, record the distance you actually sampled, and explain on the form why the remainder was not measured. For example, if the transect line intercepts an anomaly such as a stream, pond, avalanche chute, or a rock outcrop, continue to sample the line as long as it is safe to do so. Irregularities such as swamps, rock outcrops, roads, and trails, are to be sampled if they are encountered along the transect.

If a heavy or very heavy accumulation of CWD is encountered (e.g., windthrow, felled and bucked timber, logging debris), the transect may be partially sampled. Each transect is individually assessed, and a decision to split the transect is made before establishing each transect. Partial sampling reduces potential errors and sampling time.

On heavy accumulations sample as follows:

- east to west portion of transect: sample from 0 to 4 m and from 8 to 11.5 m along the transect.
- south to north portion of transect: sample from 4 to 8 m and from 11.5 to 15 m along the transect.
- record the length observed as '15 m' in cell 17 of the *coarse woody debris* form.
- note on the form under comments, the type of accumulation encountered, e.g., windthrow, felled and bucked timber, cold decks, or logging debris.

If the line falls on very heavy accumulations, sample the partial line as follows:

- east to west portion of transect: sample from 0 to 4 m along the transect.
- south to west portion of transect: sample from 4 to 8 m along the transect.
- record the length observed as '8m'.
- note on the form under comments, the type of accumulation encountered, e.g., windthrow, felled and bucked timber, cold decks, or logging debris.

Walk along the transect and measure the CWD that meets the following criteria:

- lies above the soil (Figure 2). CWD is considered no longer above the soil when it is entirely buried beneath a layer of surface organic matter (forest floor) or mineral soil.
- greater than 7.5 cm where the centreline is crossed by the vertically projected transect.
- not self-supporting; this includes:
 - fallen or suspended dead tree boles, with or without roots attached, that intercepts the vertically projected sample line whether the transect passes above or below the CWD (Figure 3). CWD may be suspended on nearby live or dead trees, other coarse woody debris, stumps, or other terrain features. Visually estimate unmeasurable suspended CWD at the intercept point.
 - fallen trees with green foliage if they are no longer rooted to the ground.
 - large fallen branches and fallen broken tree tops, horizontal or leaning.
 - Uprooted stumps greater than 7.5 cm in diameter and less than 1.3 metres in length, and any exposed dead roots greater than 7.5 cm.
 - recently cut logs.
- Note: Pieces that are physically attached (lengthwise) are considered to be one piece.

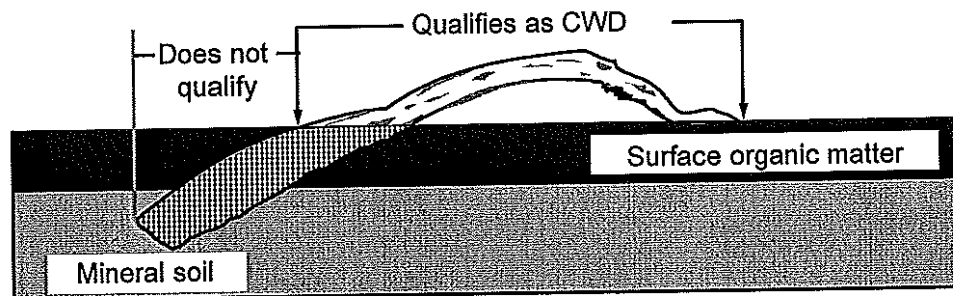


Figure 2: Side view of partially buried coarse woody debris.

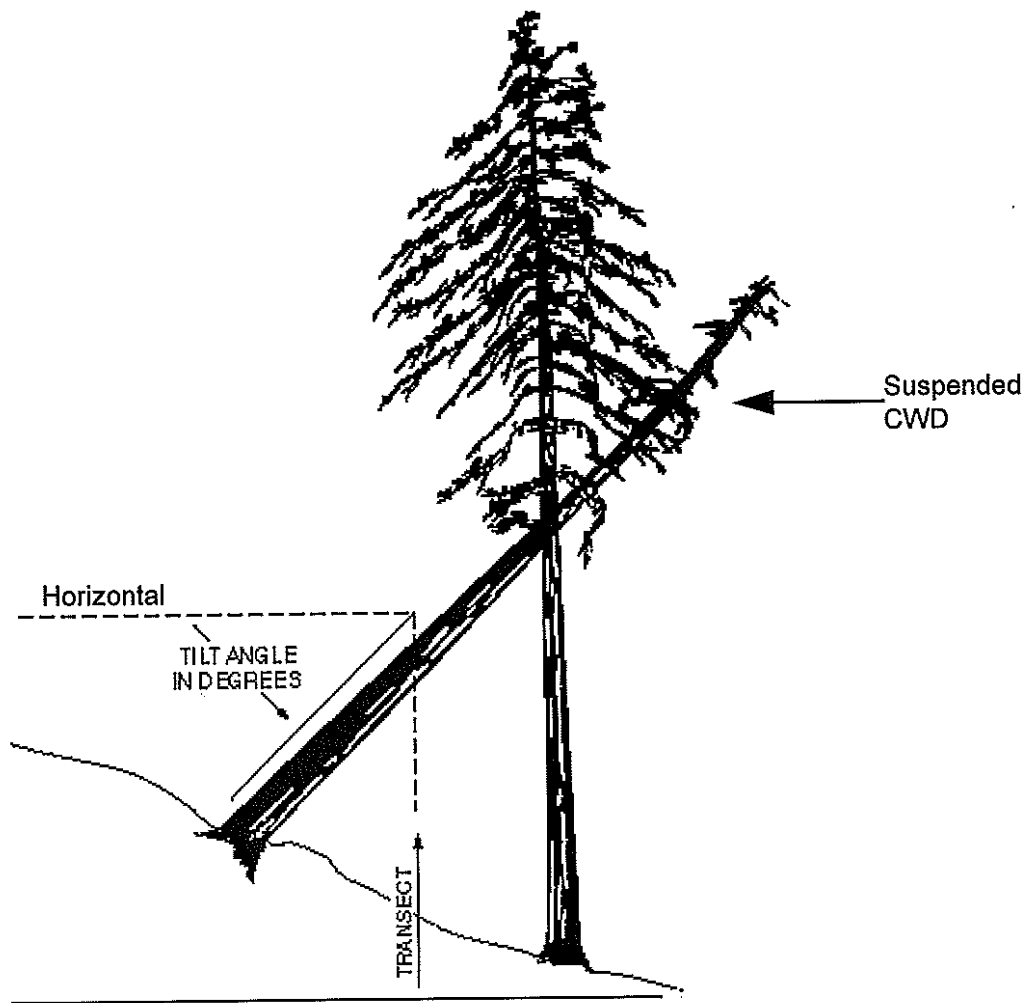


Figure 3: Measuring Suspended CWD.

Do not measure the following:

- live or dead trees (still rooted) which are self-supporting
- dead branches still connected to standing trees
- exposed roots of self supporting trees
- self-supporting stumps or their exposed roots
- debris that has decomposed to the point where it could be described as forest floor humus

Determining “in” or “out” CWD:

- To be measured, the CWD piece must be greater than 7.5 cm in diameter (or equivalent) at the point where the line transect crosses the centreline. The *centreline* is the midline of any section of wood (Figures 4, 5a and 5b), and may not correspond to the pith.

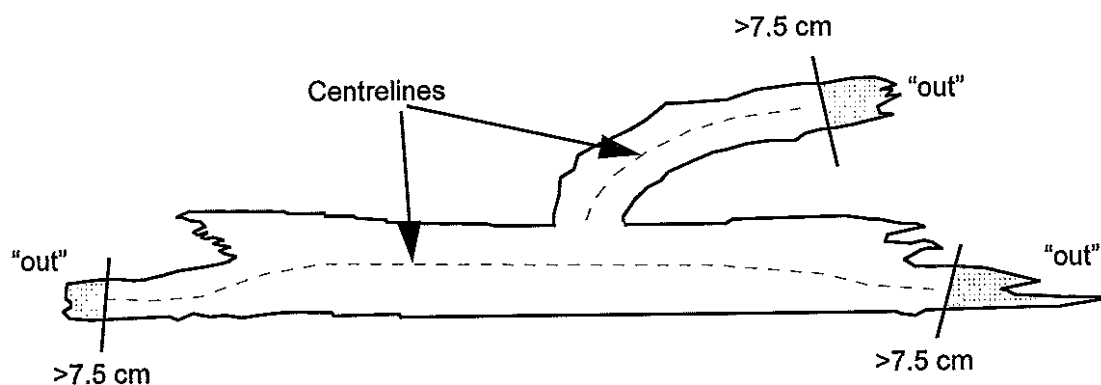


Figure 4: Centreline of a CWD piece (top view).

- If the sample line appears to follow the centreline of the CWD, decide whether it is “measured” (transect line crosses centreline of CWD) or “not measured” (transect line does not cross centreline).

Sample line $\approx$ central axis of piece
(viewed from above)

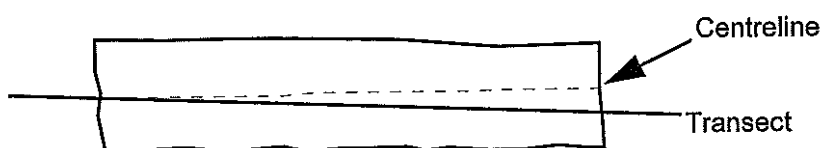


Figure 5a: Measuring CWD near the centreline of the piece.

- If the sample line is close to the centreline at the end of the CWD, decide whether it is “measured” (transect line crosses centreline of CWD) or “not measured” (transect line does not cross centreline).

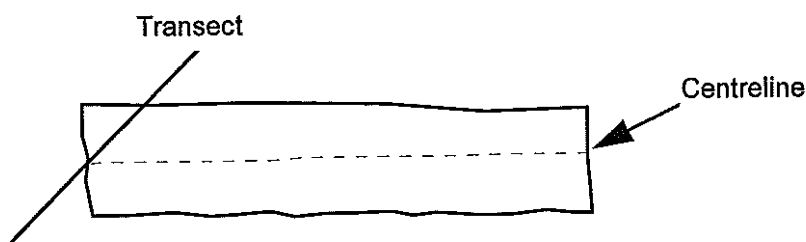


Figure 5b: Measuring CWD near the centreline of the piece.

For each CWD to be measured, record the following:

- the distance along the 30 m transect at which the CWD is encountered.
- the diameter of the CWD (see "Special notes on recording diameter" below).
- the height above the ground that the piece is suspended at the point of intersection with the transect line. Measure from the ground to the underside of the CWD.
- the decomposition class, decay level, bark presence, percent roots code and type of roots, as explained in the *Coarse Woody Debris* tables which follow. Try not to excessively damage the CWD by kicking, etc. Pieces should be left as intact as possible for future measurements. To check for roots, make a clean cut with your shovel across the piece where it intersects the transect. Record the % roots in the cross-section. Note that the numbers of the codes increase with increasing decomposition. Generally, roots are only found growing through CWD of Decomposition Classes 4 and 5, and if roots are present (i.e. % roots code = 2 or greater) then the type of roots must be recorded in cell 13.
- the length of the piece of CWD to the nearest 0.1 m.
- for pieces other than accumulations record a "C" in the "shape code" column. Do not record a depth.
- for accumulations see "measuring accumulations" below.

Special notes on recording diameter:

1. Record (to nearest cm) the diameter (or equivalent) of the CWD perpendicular to the bole at the point where the transect crosses the CWD (Figure 6).

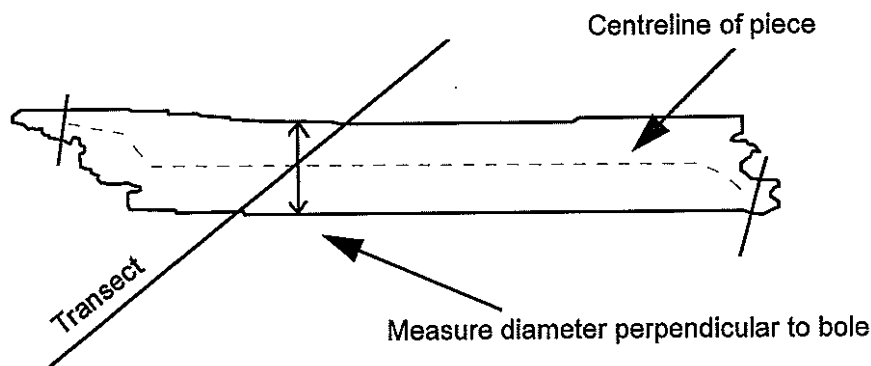


Figure 6: Measuring diameter of circular CWD cross sections.

2. Since measurements are recorded to the nearest cm, round up any diameters from 7.5 - 7.9 to 8 cm, etc.
3. If the sample line intersects a curved or angular CWD more than once, measure each intersection as a separate observation, as shown in Figure 7.

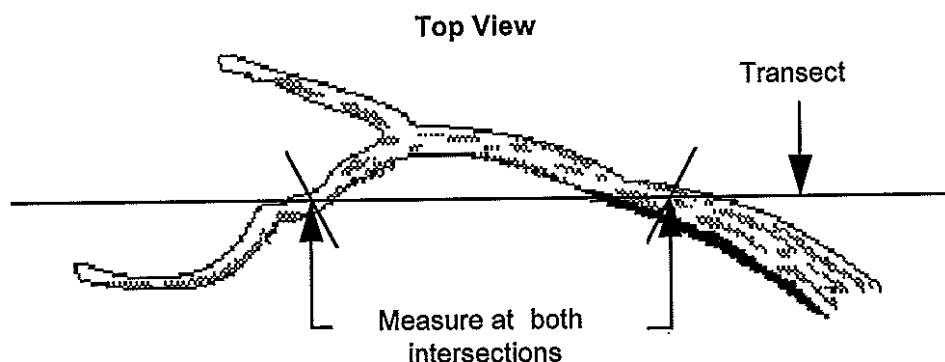


Figure 7: The sample line intersects the CWD more than once.

4. If the diameter cannot be measured, estimate it.
5. If the cross section is oval rather than circular estimate an "equivalent diameter" that will more accurately suggest the cross-section area. If the cross section is hard to express as a circle (or equivalent to a circle), mentally compress the piece into a circular cross section and record the diameter of that imaginary circle.
6. Estimate an "equivalent" diameter for the remaining portion of CWD where part of the wood has decayed and become part of the soil layer.
7. If a log has split open but is still partially held together, record the equivalent diameter as if the piece were whole. If a stem has shattered into a number of distinct unconnected pieces, record each piece that is larger than 7.5 cm in diameter at the point of sampling.
8. If the CWD is hollow, estimate the diameter equivalent to the remaining wood.
9. If the transect crosses a "cookie" (i.e. short sawed off section of bole), record the diameter of the piece and its thickness as the "length".

Special notes on recording length:

1. Record (to the nearest 0.1 m) the length of the CWD piece.
2. If a log has broken but is still partially held together, record the equivalent length as if the piece were whole.
3. If the end(s) of the piece are broken (with a jagged edge), visually fold in the broken sections to compensate for the missing parts.

Measuring Accumulations:

- To be used in heavy accumulations where individual pieces cannot be safely or accurately measured.
- Consider the accumulation as a rectangular box (See Figure 8).
- Record under the "Diameter" column, the width of the box perpendicular to the centreline of the accumulation.
- Record the "Length" of the accumulation as for regular pieces.
- Record an "A" in the "shape code" column.
- Record the average depth of the accumulation.
- Record the other information in the same way as in the standard transect section.

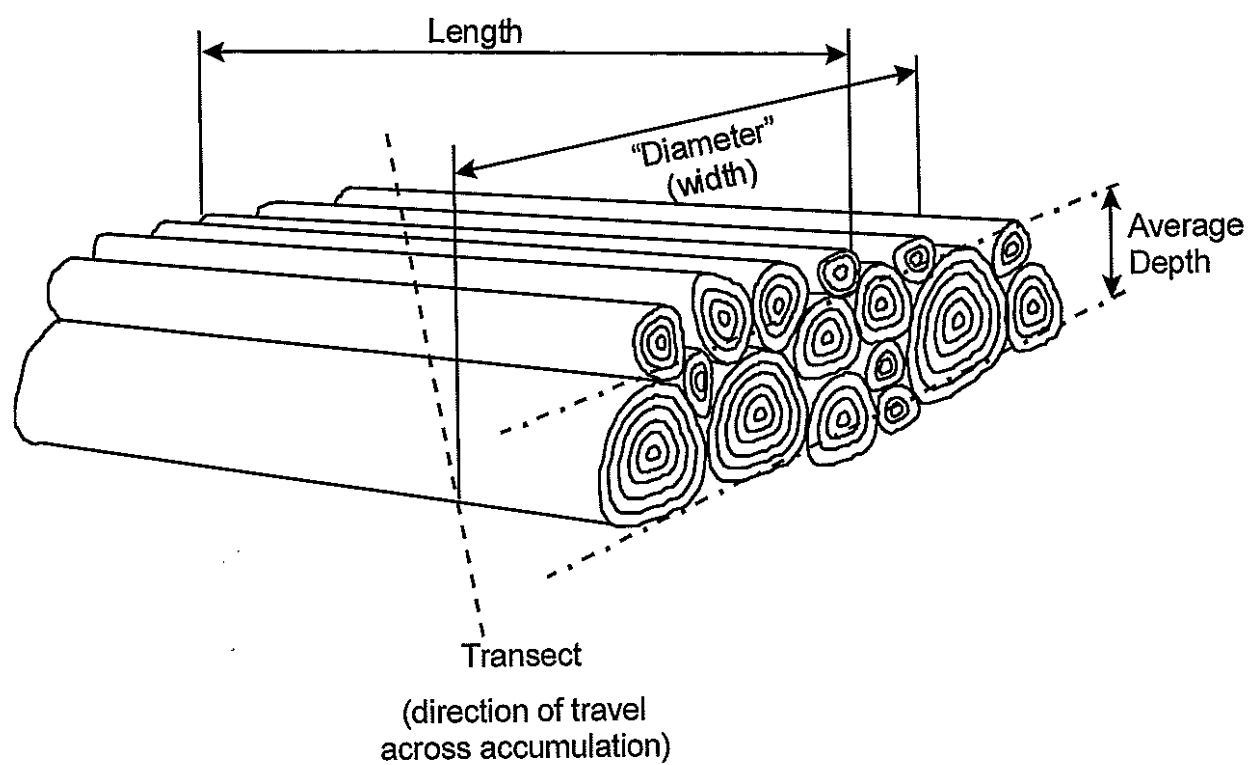


Figure 8: Measuring Accumulations

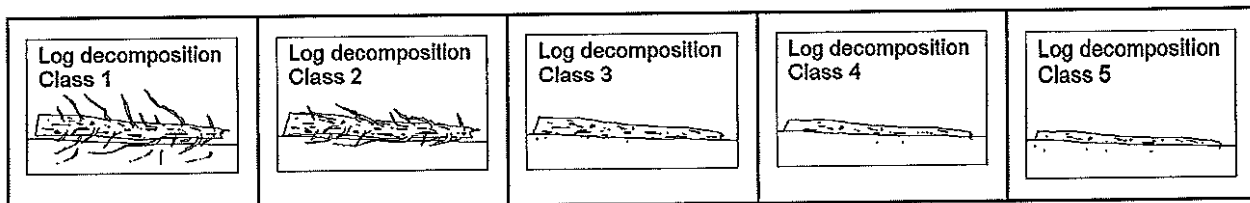
1. **Obligation Number:** Repeat the Obligation number that was recorded on the Administration Form.
2. **Measurement Date:** Enter the date on which the information was collected. See Administration Table, cell 16 for format.
3. **Initials of Recorders:** Enter the initials of those completing the form. See Administration Table, cell 17 for format.
4. **Contractor:** Enter the contractor's name or abbreviation. See Administration Table, cell 18 for format.
5. Record the Card No. (e.g. 1 out of 2 Course Woody Debris cards.)

6. Distance (m)	Field Guide Pg.: n/a	Form: CWD
Code Definition	Acceptable Codes	
Record the distance along the transect where any piece of woody debris ≥ 7.5 cm in diameter is encountered.	0.0 - 30.0	
Field Type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 m	Example entry: debris encountered at 27.2 m	2 7 2

7. Diameter (cm)	Field Guide Pg.:	Form: CWD
Code Definition	Acceptable Codes	
Record the diameter of the debris at the point of interception	8.0 - 300.0	
Field Type: Numeric	Justification: Right	
Sampling Standard: ± 1 cm	Example entry: Debris is 122 cm in diameter	1 2 2

8. Height above ground (cm)	Field Guide Pg.: n/a	Form: CWD
Code Definition	Acceptable Codes	
Record the height above ground to the bottom of the log.	0 - 500	
Field Type: Numeric	Justification: Right	
Sampling Standard: ± 1 cm	Example entry: Log is suspended 5 cm above ground	5

9. Decomposition Class	Field Guide Pg.: n/a	Form: CWD
Code Definition	Acceptable Codes	
Record the Log Decomposition Class by the picture that best represents the log in question. (See figure below)	1-5	
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Debris is best described by the picture for Log Decomposition Class 3.	3



10. Decay Level	Field Guide Pg.: n/a	Form: CWD
Code Definition	Acceptable Codes	
Record the decay level of the debris: Intact Intact to partly soft Hard, large pieces Small, soft, blocky pieces Soft and powdery	1 2 3 4 5	
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: Hard, large pieces	3

11. Bark Presence	Field Guide Pg.: n/a	Form: CWD
Code Definition	Acceptable Codes	
Record the percent of bark present 100% 75-99% 50-74% 25-49% 0-24%	1 2 3 4 5	
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: 60% bark present	3

12. Percent of Roots	Field Guide Pg.: n/a	Form: CWD
Code Definition	Acceptable Codes	
Record the percent of cross-sectional area of woody debris filled with roots: 0% 1-24% 25-49% 50-74% ≥ 75%	1 2 3 4 5	
Field Type: Numeric	Justification: n/a	
Sampling Standard: n/a	Example entry: 40% filled with roots	3

13. Type of Roots	Field Guide Pg.: n/a	Form: CWD
Code Definition	Acceptable Codes	
Record the type of roots: Fine Coarse and Fine	F C	
Field Type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: Fine roots	F

14. Length (m)	Field Guide Pg.: n/a	Form: CWD
Code Definition	Acceptable Codes	
Record the length of the CWD piece. See special notes on recording length.	0 - 55.0	
Field Type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 m	Example entry: CWD piece is 13.1 m long	1 3 1

15. Shape of CWD: Accumulation/Circular	Field Guide Pg.: n/a	Form: CWD
Code Definition	Acceptable Codes	
Record the appropriate code: Accumulation Circular	A C	
Field Type: Character	Justification: n/a	
Sampling Standard: n/a	Example entry: Accumulation measured as a rectangular box	A

16. Depth of accumulation (cm)	Field Guide Pg.:	Form: CWD
Code Definition	Acceptable Codes	
Record the average depth of the accumulation. See Figure 8. If the CWD piece is circular (shape = C), field will be blank.	50 - 300.0	
Field Type: Numeric	Justification: Right	
Sampling Standard: ± 5 cm	Example entry: Accumulation has an average depth of 147 cm	1 4 7

17. Length of transect (m)	Field Guide Pg.:	Form: CWD
Code Definition	Acceptable Codes	
Record the length of transect sampled. Use comment section to provide reason(s) why entire transect could not be sampled, e.g., very heavy accumulations, windthrow, etc. or unsafe.	0 - 30	
Field Type: Numeric	Justification: Right	
Sampling Standard: ± 0.1 m	Example entry: Length of transect sampled was 22m	2 2

Installation Diagram

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark	C.P.	Block	Installation
<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>

2. Measurement Date

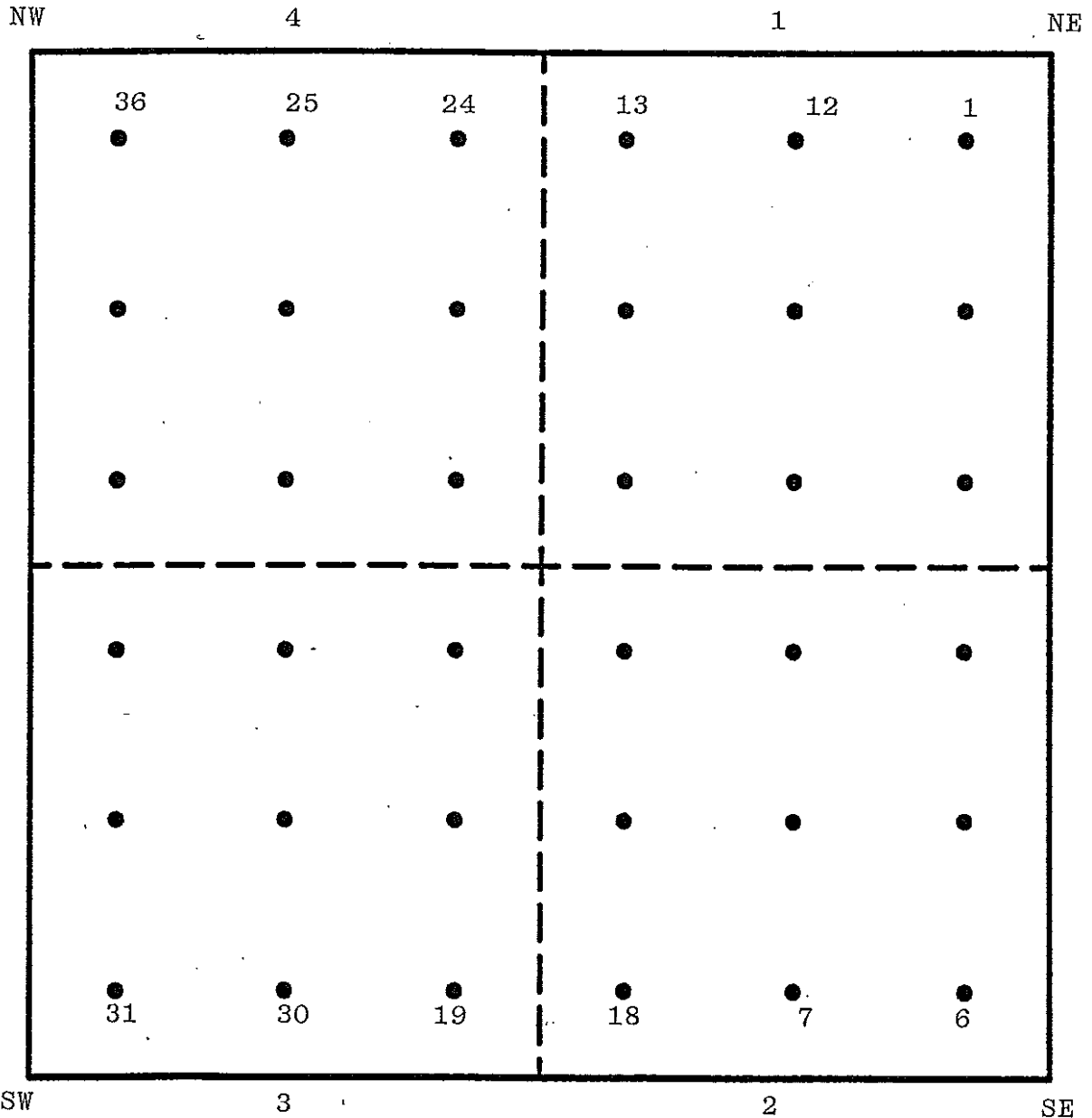
y			m		d	
<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>

3. Initials of Recorders

<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>

4. Contractor

<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>	<div style="border: 1px solid black; height: 15px; width: 100%;"></div>



Scale: 1 cm = 2 m

INSTALLATION DIAGRAM

NORTHERN INTERIOR VEGETATION MANAGEMENT ASSOCIATION

1. Obligation No.

Timbermark

C.P.

Block

Installation

03A009 | | 9 | 23 | 3

2. Measurement Date

19970814

3. Initials of Recorders

AME | | |

4. Contractor

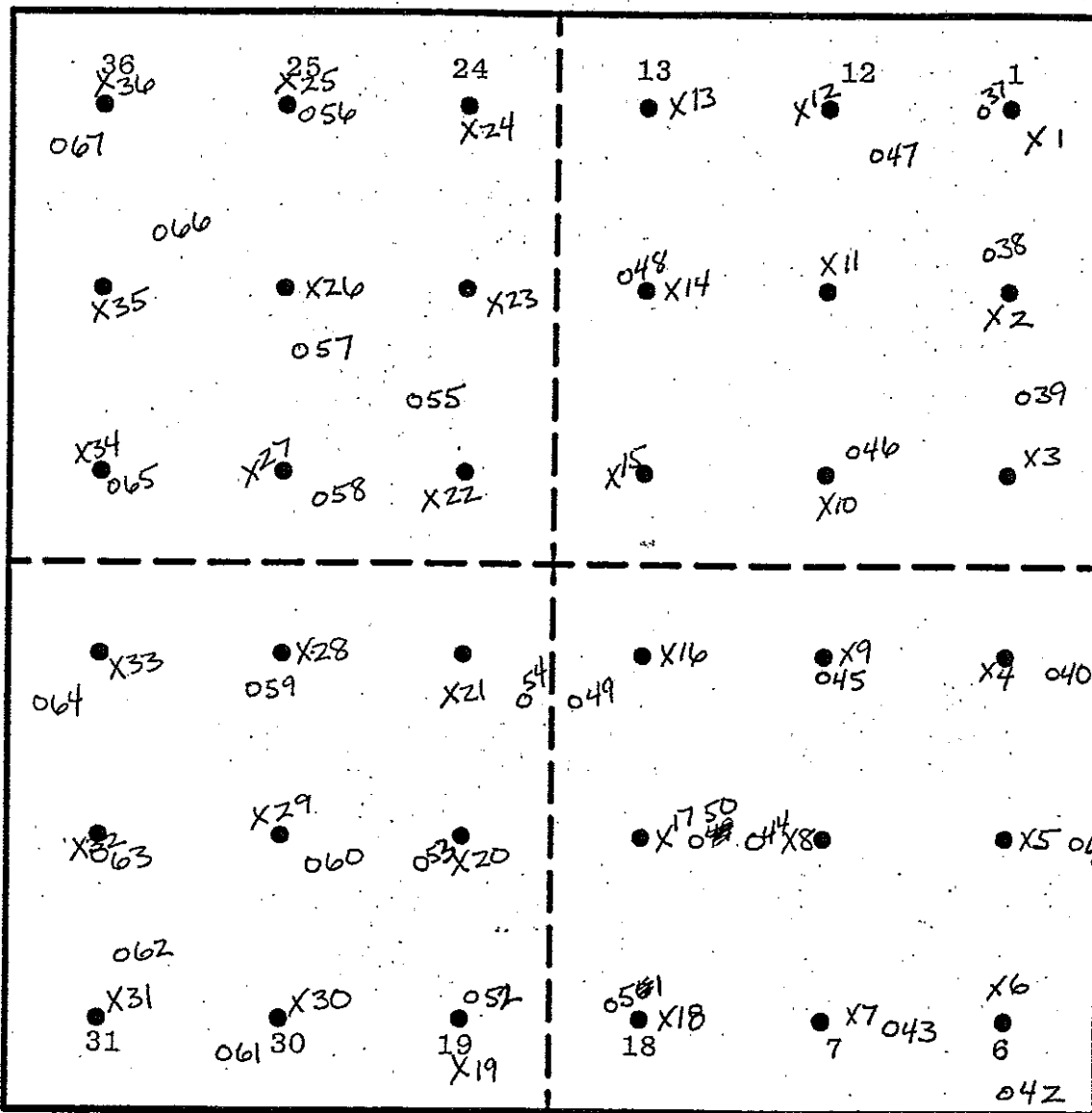
SILVTR|E|E

NW

4

1

NE



SW

3

2

SE

X = Sx

O = B1

Scale: 1 cm = 2 m

INSTALLATION DIAGRAM

Appendix 1

Damage Agent, Condition

and Severity Codes

Damaging Agents		Damage Code	Severity Rating	Page 1 of 6
A ABIOTIC INJURIES		A		Severity Code
FIRE		AB	No severity code required	
DROUGHT		AD		
FROST:		AF		
frost crack		AFC		
frost heaved		AFH		
shoot/bud frost kill		AFK		
HAIL		AH		
FUMEKILL		AK		
LIGHTNING		AL		
ROAD SALT		AN		
FLOODING		AO		
REDBELT		AR		
SLIDE		AS		
RAVELLING		AV		
WINDTHROW:		AW		
soil failure		AWS		
treatment or harvesting-related		AWT		
SNOW OR ICE (includes snow press)		AY		
SUNSCALD		AZ		
DISEASES			Enter percentage of crown infected	1-100
BROOM RUSTS		DB	No severity code required	
fir broom rust <i>Melampsorella caryophyllacearum</i>		DBF		
spruce broom rust <i>Chrysomyxa arctostaphyli</i>		DBS		
STEM DECAYS		DD		
birch trunk rot, <i>Fomes fomentarius</i>		DDB		
sulfur fungus, <i>Laetiporus sulphureus</i>		DDD		
rust-red stringy rot <i>Echinodontium tinctorium</i>		DDE		
brown crumbly rot <i>Fomitopsis pinicola</i>		DDF		
hardwood trunk rot, <i>Phellinus ignarius</i>		DDH		
cedar brown pocket rot, <i>Portia sericeomollis</i>		DDO		
pini (red ring) rot <i>Phellinus pini</i>		DDP		
quinine conk rot, <i>Fomitopsis officinalis</i>		DDQ		
Schweinitz butt rot, <i>Phaeolus schweinitzii</i>		DDS		
aspen stem rot <i>Phellinus tremulae</i>		DDT		
FOLIAGE DISEASES		DF		
western pine-aster rust <i>Coleosporium asterum</i>		DFA	Enter percentage of crown infected.	1-100
large-spored spruce labrador tea rust <i>Chrysomyxa ledicola</i>		DFC		
Spruce needle cast <i>Lirula macrospora</i>		DFD		
elytroderma disease <i>Elytroderma deformans</i>		DFE		
larch needle blight <i>Hypodermella laricis</i>		DFH		

Damaging Agents		Damage Code	Severity Rating	Page 2 of 6 Severity Code
pine needle cast <i>Lophodermella concolor</i>		DFL	Enter percentage of crown infected	1-100
larch needle cast <i>Meria laricis</i>		DFM		
fir-fireweed rust <i>Pucciniastrum epilobii</i>		DFP		
Douglas-fir needle cast <i>Rhabdocline pseudotsugae</i>		DFR		
red band needle blight <i>Mycosphaerella pini</i>		DFS		
sirococcus tip blight <i>Sirococcus strobilinus</i>		DFT		
cedar leaf blight <i>Didymascella thujae</i>		DFU		
LEADER OR BRANCH DIEBACK				1-100
dermea canker <i>Dermea pseudotsugae</i>		DL	Enter percentage of crown infected.	
red flag disease <i>Potebniamyces balsamicola</i>		DLD		
phomopsis canker of Douglas-fir <i>Phomopsis lokoyae</i>		DLF		
sydowia tip dieback <i>Sclerophoma pithyophila</i>		DLP		
aspen-poplar twig blight <i>Venturia</i> spp. (Shepherd's Crook)		DLS		
DWARF MISTLETOES		DLV		
Douglas-fir dwarf mistletoe <i>Arceuthobium douglasii</i>		DM	See Figure A4.2 ¹ for Hawksworth's 6-class rating system for all species	1-6
larch dwarf mistletoe <i>Arceuthobium laricis</i>		DMF		
lodgepole pine dwarf mistletoe <i>Arceuthobium americanum</i>		DML		
hemlock dwarf mistletoe <i>Arceuthobium tsugense</i>		DMP		
		DMH	See Figure A4.2 ¹ for Hawksworth's 6-class rating system for all species and: Stem Swelling Defect class for coastal western hemlock ≥ 1 minor stem swelling per tree ≥ 1 major stem swelling per tree	1-6 N M
ROOT DISEASES				SC RL RS BR CS
armillaria root disease <i>Armillaria ostoyae</i> *		DR	-Severe crown symptoms	
black stain root disease <i>Leptographium wagneri</i>		DRA	-Basal resinosis (light) ≤ 50%	
laminated root rot, cedar strain <i>Phellinus weirii</i>		DRB	-Basal resinosis (severe) > 50%	
laminated root rot <i>Inonotus sulphurascens</i> (<i>Phellinus weirii</i>)		DRC	-Butt rot	
annosus root disease <i>Heterobasidion annosum</i>		DRL	-Confirmatory symptoms: stain, decay, mycelial fans, sporophores	
rhizina root disease <i>Rhizina undulata</i>		DRN		
schweinitzii butt rot <i>Phaeolus schweinitzii</i>		DRR		
tomentosus root rot <i>Inonotus tomentosus</i> *		DRS		
		DRT	*When <i>armillaria</i> or <i>tomentosus</i> root diseases are confirmed in the field in the pre-harvest stand, be sure to also complete the <i>Root Disease Information</i> form. In the case of <i>tomentosus</i> , make sure that the stumps are checked again post-harvest.	

¹ Forest Productivity Councils of British Columbia and BC Ministry of Forests, Inventory Branch. 1993. Minimum Standards for the Establishment and Remeasurement of Permanent Sample Plots in British Columbia. Forest Productivity Councils of BC and BC Min. For., Inventory Branch, Victoria, BC.

Damaging Agents		Damage Code	Severity Rating	Page 3 of 6 Severity Code
STEM DISEASE (bark cankers and rusts)		DS	-Branch canker(s);	BC
atropellis canker <i>Atropellis piniphila</i>		DSA	-Stem canker(s);	SC
white pine blister rust <i>Cronartium ribicola</i>		DSB	-Top kill.	TK
comandra blister rust <i>Cronartium comandrae</i>		DSC	A note about cankers and rusts: Please only code cankers and rusts to genus and species if you are sure of what you see. This sometimes may require microscopy either by you or by sending samples to a pathologist. Even then with some cankers, a positive identification cannot be made because all sorts of things could be living and growing in the area of the canker.	
sooty bark canker, <i>Encoelia pruinosa</i>		DSE		
western gall rust <i>Endocronartium harknessii</i>		DSG		
hypoxylon canker, <i>Hypoxylon mammatum</i>		DSH		
<i>Leucostoma kurzei</i>		DSL		
cryptosphaeria canker, <i>Cryptosphaeria populina</i>		DSP		
ceratocystis canker, <i>Ceratocystis fimbriata</i>		DSR		
orange stalactiform blister rust <i>Cronartium coleosporioides</i>		DSS		
target canker, <i>Nectria galligena</i>		DST		
cytospora canker, <i>Cytospora chrysosperma</i>		DSY		
INSECTS			Enter percentage of crown infected.	1-100
APHIDS		IA	Refer to Table 4 from the Bark Beetle Management guidebook ² for a description of symptoms for year of attack by various bark beetles.	1 2 3 4 5 6
balsam woolly adelgid <i>Adelges piceae</i>		IAB		
giant conifer aphid, <i>Cinara</i> spp.		IAC		
Cooley spruce gall adelgid <i>Adelges cooleyi</i>		IAG		
larch cone wholly aphid, <i>Adelges lariciatus</i>		IAL		
spruce aphid <i>Elatobium abietinum</i>		IAS		
BARK BEETLES		IB		
western balsam bark beetle <i>Dryocoetes confusus</i>		IBB	Year of Attack:	
Douglas-fir beetle <i>Dendroctonus pseudotsugae</i>		IBD	-1-year post attack	
engraver beetles, <i>Ips</i>		IBI	-full: (whole crown)	
mountain pine beetle <i>Dendroctonus ponderosae</i>		IBM	-strip: (part of crown)	
twig beetles, <i>Pityogenes</i> , <i>Pityophthorus</i> spp.		IBP	-2-year post attack	
spruce beetle <i>Dendroctonus rufipennis</i>		IBS	-full: (whole crown)	
red turpentine beetle <i>Dendroctonus valens</i>		IBT	-strip: (part of crown)	
western pine beetle <i>Dendroctonus brevicornis</i>		IBW	-2-year post attack	
			-3-year post attack	

² BC Ministry of Forests. 1995. Forest Practices Code of British Columbia Bark Beetle Management Guidebook. Province of British Columbia, Victoria, BC. p.9.

Damaging Agents		Damage Code	Severity Rating	Severity Code
DEFOLIATORS		ID	Fette's scale; (See Figure A4.3 ³) current year foliage only. Enter percent defoliated.	1-100
black army cutworm <i>Actebia fennica</i>		IDA		
two-year cycle budworm <i>Choristoneura biennis</i>		IDB		
larch casebearer <i>Coleophora laricella</i>		IDC		
western winter moth <i>Erannis vancouverensis</i>		IDD		
spruce budworm <i>Choristoneura fumiferana</i>		IDE		
forest tent caterpillar <i>Malacosoma disstria</i>		IDF		
green-striped forest looper <i>Melanolophis imitata</i>		IDG		
western blackheaded budworm <i>Acleris gloverana</i>		IDH		
pine needle sheath miner <i>Zelleria hainbachi</i>		IDI		
western hemlock looper <i>Lambdina fiscellaria lugubrosa</i>		IDL		
gypsy moth <i>Lymantria dispar</i>		IDM		
birch leaf miner, <i>Fenusa pusilla</i>		IDN		
larch sawfly <i>Pristiphora erichsonii</i>		IDP		
woolly alder sawfly <i>Eriocampa ovata</i>		IDR		
conifer sawflies <i>Neodiprion</i> spp.		IDS		
satin moth <i>Leucoma salicis</i>		IDU		
variegated cutworm, <i>Peridroma saucia</i>		IDV		
western spruce budworm <i>Choristoneura occidentalis</i>		IDW		
large aspen tortrix <i>Choristoneura conflictana</i>		IDX		
Douglas-fir tussock moth <i>Orgyia pseudotsugata</i>		IDT		
western false hemlock looper <i>Neptia freemani</i>		IDZ		
WOOD BORERS / PHILOEM FEEDERS		IS	Wickman's scale; Douglas-fir tussock moth and western hemlock looper: Enter percent defoliated (See Figure A4.4 ⁴). No severity codes required	10, 25, 50, 75, 90, 100.
western cedar borer <i>Trachykele blondeli</i>		ISB		
European pine shoot moth, <i>Rhyacionia buoliana</i>		ISE		
gouty pitch midge, <i>Cecidomyia pininopsis</i>		ISG		
pitch nodule moths <i>Petrova</i> spp.		ISP		
Sequoia pitch moth <i>Synanthedon sequoiae</i>		ISQ		
western pine shoot borer <i>Eucosma sonomana</i>		ISS		

³ Forest Productivity Councils of British Columbia and BC Ministry of Forests, Inventory Branch. 1993. Minimum Standards for the Establishment and Remeasurement of Permanent Sample Plots in British Columbia. Forest Productivity Councils of BC and BC Min. For., Inventory Branch, Victoria, BC.

⁴ Ibid., p. 22.

Page 5 of 6		Severity Code	
Damaging Agents	Damage Code	Severity Rating	Severity Code
ROOT AND TERMINAL WEEVILS	IW	Enter number of current attacks AND type of defect. (See Figure A4.1 ⁵)	0 to 9 attacks, and
<i>Magdalis</i> sp.	IWM	-Minor crook	N
lodgpole pine terminal weevil <i>Pissodes terminalis</i>	IWP	-Major crook	M
white pine (spruce) weevil <i>Pissodes strobi</i>	IWS	-Forking	F
cylindrocarpus weevil, <i>Cylindrocarpus</i> spp.	IWY	-Staghead	S
Yosemite bark weevil, <i>Pissodes schwartzii</i>	IWZ	No severity codes required	
conifer seedling weevil <i>Steremnius carinatus</i>	IWC	No severity codes required	
Warren's root collar weevil <i>Hyllobius warreni</i>	IWW	No severity codes required	
M-MITES	M	No severity codes required	
T. TREATMENT INJURIES		No severity codes required	
CHEMICAL	TC		
HUMAN (stepped on tree)	THS		
LOGGING	TL		
MECHANICAL (non-logging)	TM		
PLANTING:	TP		
planting - planted deep	TPD		
planting - poor microsite	TPM		
PRUNING OR SPACING	TR		
THINNING	TT	Stem scarred	S
SHEEP	TS	Browsed	B
V. VEGETATION PROBLEMS		No severity codes required	
HERBACEOUS COMPETITION	VH		
VEGETATION PRESS	VP		
SHRUB COMPETITION	VS		
TREE COMPETITION	VT		
W. WILDLIFE DAMAGE	W	Enter percent girdled, if applicable, OR Browsed, OR Trampled, OR Browsed and Trampled Girdling takes precedence over browsing and trampling.	1-100 B T BT
BEAR	WB		
BEAVER	WZ		
BIRD	WA		
CATTLE	WC		
DEER	WD		
ELK	WE		
HARE OR RABBIT	WH		
MOOSE	WM		
PORCUPINE	WP		
SQUIRREL	WS		
VOLE	WV		

⁵ Ibid., p. 20.

Damaging Agents		Damage Code	Severity Rating	Page 6 of 6
C. TREE CONDITION				Severity Code
TOP/LEADER				
Bent		BT		No Severity Code Required
Broken		KT		
Dead		DT		
Dead Lateral Buds		DLB		
Dead Terminal Bud		DTB		
New Leader		NL		
FOLIAGE				
Chlorotic		C		No Severity Code Required
Mottled		MOT		
Necrotic		N		
Re-flushed (Lammas Growth)		R		
Stunted Needles		SN		
STEM				
Bent		BM		No Severity Code Required
Basal Sweep		BS		
Blistered		BL		
Broken		KS		
Crook		CR		
Cut		CS		
Fork		F		
Leaning		L		
Scarring/Rubbing		X		
ROOTS/PLUG				
Exposed Roots or Plug		ER		No Severity Code Required
TREATMENT CONDITION				
Stubbed Tree		ST		No Severity Code Required

Table 3. Bole symptoms of successful bark beetle attack

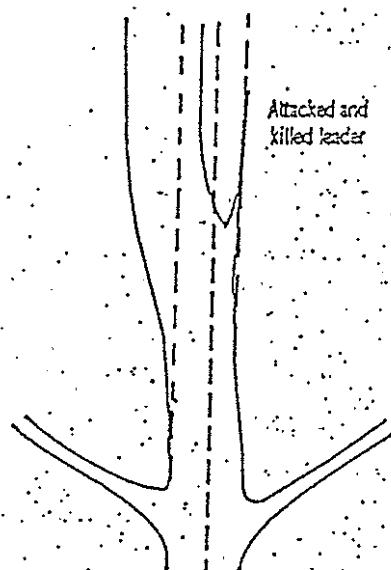
	Mountain pine beetle	Spruce beetle	Douglas-fir beetle
Pitch tubes	<ul style="list-style-type: none"> usually present and obvious boring dust at base of tree 	<ul style="list-style-type: none"> may be present but small boring dust at base of tree and in bark crevices 	<ul style="list-style-type: none"> rarely present boring dust at base of tree and in bark crevices resin flow on upper bole
Position of attack on host	<ul style="list-style-type: none"> lower 3/4 of bole of living trees only 	<ul style="list-style-type: none"> usually lower 4 m on live standing trees underside of downed material 	<ul style="list-style-type: none"> lower 2/3 of bole on live standing trees downed material
Woodpecker signs	<ul style="list-style-type: none"> extensive bark stripping in winter and spring following attack 	<ul style="list-style-type: none"> extensive bark stripping late summer and winter after attack (bole appears reddish) 	<ul style="list-style-type: none"> little bark stripping

Table 4. Foliage symptoms of successful bark beetle attack

	Mountain pine beetle	Spruce beetle	Douglas-fir beetle
1-year post attack	<ul style="list-style-type: none"> bright red crown in spring following attack^a 	<ul style="list-style-type: none"> no colour change in first spring following attack 	<ul style="list-style-type: none"> bright red crown in spring following attack may turn red in year of attack
2-year post attack	<ul style="list-style-type: none"> dull red foliage remains on tree 	<ul style="list-style-type: none"> general yellowing or graying of crowns after 24 to 30 months colour change not reliable 	<ul style="list-style-type: none"> crowns gray in spring 2 yrs after attack
3-year post attack	<ul style="list-style-type: none"> crowns gray little foliage remains 	<ul style="list-style-type: none"> gray crowns needle drop 	<ul style="list-style-type: none"> crowns gray little foliage remains

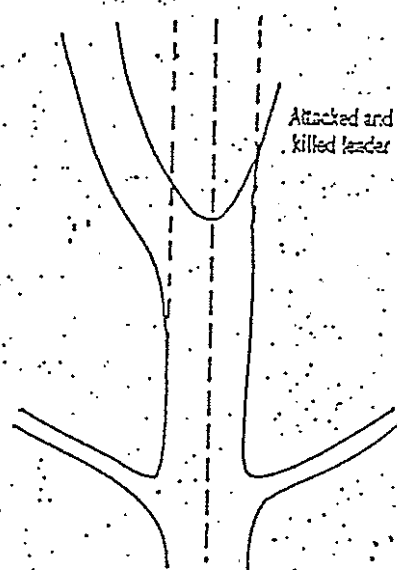
^a Pw fades in same year as attack

From: BC Ministry of Forests. 1995. Forest Practices Code of British Columbia Bark Beetle Management Guidebook. Province of British Columbia, Victoria, B.C. p.9.



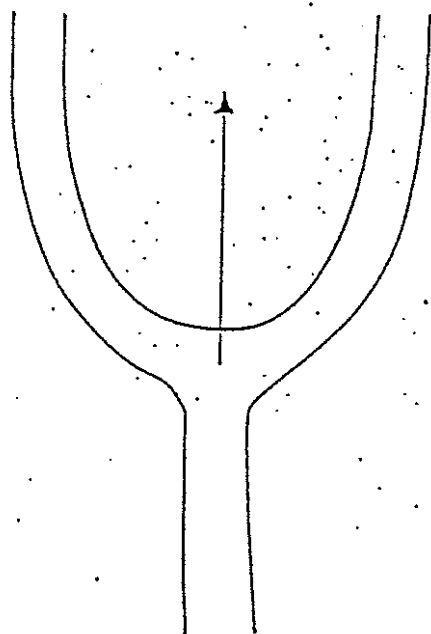
Minor crook (creasa)

A defect made up of a linear indentation, but little or no stem curvature at point of attack



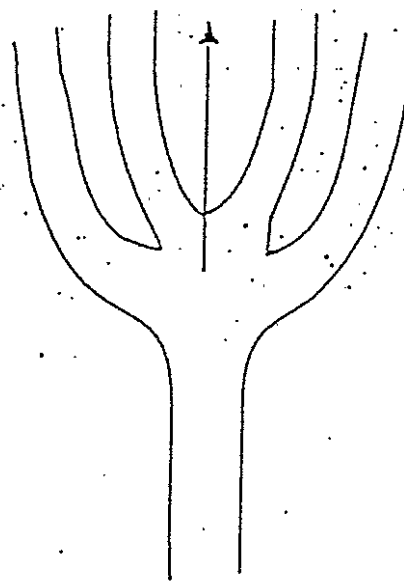
Major crook

A defect defined when a lateral assuming dominance is offset from the main stem by at least $1/2$ the stem diameter



Major forks

A defect resulting when two laterals assume dominance



Staghead

A defect resulting from three or more laterals assuming dominance

FIGURE A4.1. Terminal wood defect rating scale.

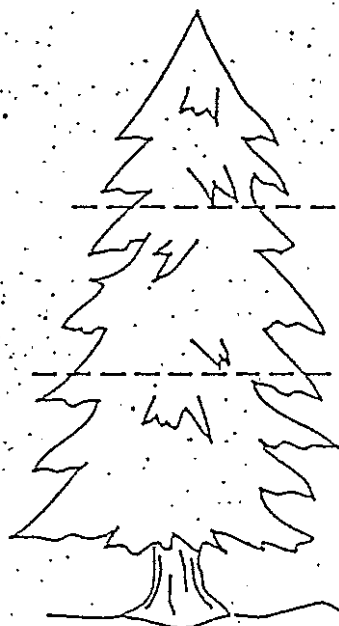
Modified From: Forest Productivity Councils of British Columbia and B.C. Ministry of Forests, Inventory Branch. 1993. Minimum Standards for the Establishment and Remeasurement of Permanent Sample Plots in British Columbia. Forest Productivity Councils of B.C. and B.C. Min. For., Inventory Branch, Victoria, B.C.

Appendix 4. (continued)

The 6-class Dwarf Mistletoe rating system

Instructions

- Step 1** Divide live crown into thirds.
- Step 2** Rate each third separately. Each third should be given a rating of 0, 1, or 2 as described below:
- (0) no visible infections;
 - (1) light infection (1/2 or less of total number of branches in the third infected);
 - (2) heavy infection (more than 1/2 of total number of branches in the third infected).
- Step 3** Add ratings of thirds to obtain rating for total tree.



Example

If this third has no visible infections, its rating is (0).

If this third is lightly infected, its rating is (1).

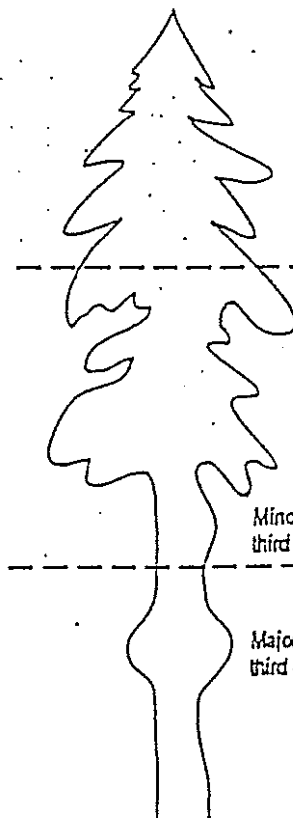
If this third is heavily infected, its rating is (2).

The tree in this example gets a rating of:
 $0 + 1 + 2 = 3$.

Coastal Western Hemlock Dwarf Mistletoe rating system

Instructions

- Step 1** Divide tree into thirds.
- Step 2** Rate each third separately. Each third should be given a rating of 0, 1, or 2 as described below:
- (0) no visible infections;
 - (1) light infection (1/2 or less of total number of branches in the third infected);
 - (2) heavy infection (more than 1/2 of total number of branches in the third infected).
- Step 3** Code each system swelling as described below:
- (N) minor stem swelling, <25% of bole circumference affected;
 - (M) major stem swelling, >25% of bole circumference affected.
- Step 3** Add ratings of thirds to obtain rating for total tree. Include code for the stem swelling with the greatest impact.



Example

If this third is lightly infected, its rating is (1).

If this third is heavily infected, its rating is (2).

Minor stem swelling. This third gets the code (N).

Major stem swelling. This third gets the code (M).

If this third has no visible infections, its rating is (0).

The tree in this example gets a rating of 3M.

Appendix 4. (continued)

<p>Class 0</p> <p>0</p> 	<p>Class 1</p> <p>1-20%</p> <p>1-10 11-20</p>  	<p>Class 2</p> <p>21-40%</p> <p>21-30 31-40</p>  	<p>Class 3</p> <p>41-60%</p> <p>41-50 51-60</p>  
<p>Class 4</p> <p>61-80%</p> <p>61-70 71-80</p>  	<p>Class 5</p> <p>81-99%</p> <p>81-90 91-99</p>  	<p>Class 6</p> <p>100%</p> <p>100</p> 	<p>Class 7</p> <p>Bud destruction and/or shoot destruction</p> <p>0</p> 

FIGURE A4.3. Insect defoliation scale.

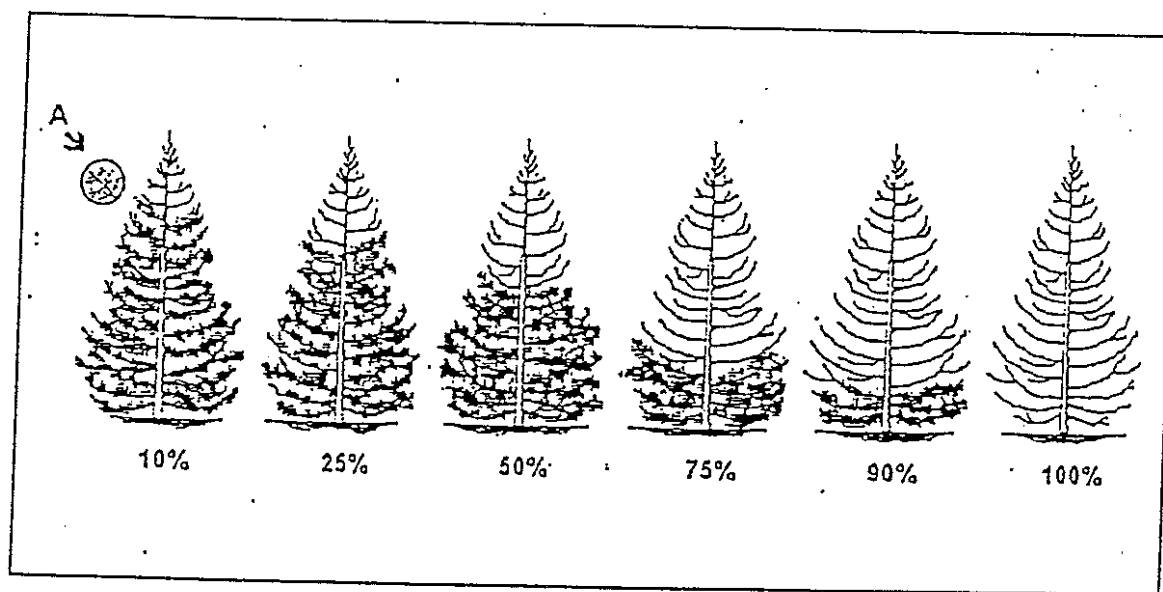


FIGURE A4.4. Douglas-fir tussock moth defoliation scales.

From: Forest Productivity Councils of British Columbia and B.C. Ministry of Forests, Inventory Branch. 1993. Minimum Standards for the Establishment and Remeasurement of Permanent Sample Plots in British Columbia. Forest Productivity Councils of B.C. and B.C. Min. For., Inventory Branch, Victoria, B.C.